The Economic Feasibility of Growing Colorado Spruce In Northern Idaho

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BUL 830

Introduction

Most farm operators equate success in agriculture with profitability. Long-run profitability is essential to farm business survival and is highly dependent on decisions made by the farm operator. Specimen tree growers, like others in agriculture, must decide how to best allocate a limited supply of land, labor, and capital. Allocating these limited resources wisely could be the difference between business success or possible failure. Specific questions that current or prospective growers might consider are:

- Should I grow specimen trees?
- Do I have the management skills to grow specimen trees?
- What type of tree or trees should I grow?
- Should I purchase land to grow trees?
- How should I harvest my trees?
- Should I market the trees myself or leave it to someone else?

The answers to these and many other questions have economic implications that should be carefully weighed by current or prospective specimen tree growers. Knowledge about costs of production and expected returns is crucial in evaluating the economic feasibility of any potential business venture.

The greenhouse and nursery industry in Idaho has grown substantially. From 1996 to 1999, gross sales grew from $37.9 million to $61.7 million. (Idaho Agricultural Statistics, Idaho Department of Agriculture and USDA). Although university research has been conducted for this growing industry, little economic information has been developed to aid growers in making sound management decisions. The objective of this publication is to present an economic analysis of growing Colorado Spruce specimen trees on a small plantation in Northern Idaho.

The Model Plantation

The model plantation is five acres of Colorado Spruce trees, planted on a suitable site in terms of drainage, soils, slope, and climate. The site is prepared the year before planting by spraying weeds, cultivating soils, and controlling rodents. Access roads also are developed and graveled in the preparation year. In Year 2, rows are marked and trees are planted in 6.5-foot by 6.5-foot spaces resulting in 800 trees per planted acre. Seedlings are purchased as bare root plants and typically are two to four years old at planting. Every sixth row is left unplanted to provide tractor access for spraying, fertilizing, pruning, and harvesting. Trees are grown and maintained through Year 6 before any digging (harvesting) takes place. The first digging, in Year 6, is done mainly to thin and provide growing space for the remaining trees. Approximately 100 trees per acre are dug in the thinning year and range in height from four to five feet. The remaining trees are harvested over the next five years, starting in Year 7, and will range from six feet in Year 7 to ten feet tall in Year 11. A custom operator provides the digging service, and a broker sells the trees for a commission.

The model farm and additional assumptions in this study were based upon information supplied by Idaho growers and extension specialists. The cultural practices and inputs are representative of typical operations used by specimen/conifer tree growers in Idaho.

Capital Requirements

The model plantation consists of five acres of land, a 3/4-ton pick-up truck, a 15-horsepower tractor, a rotary tiller and miscellaneous tools and equipment for pruning, spraying, and applying fertilizer to trees (Table 1). Because of the small size of the plantation, only 10% of the pick-up, 25% of the tractor, and 20% of the rotary tiller are attributed to the growing of Colorado Spruce. The remainder of their use is attributed to other farm production chores and/or household use. Because of the small business size, building or facility investments are excluded from this operation. Capital is required to prepare the planting site, plant trees, and grow them to a marketable size. These establishment costs are summed and amortized over the years the trees are harvested. Table 1 lists the capital requirements to develop the plantation. The prices on all machinery and equipment reflect 1999 retail purchase prices.

Resources

Land, labor, and capital are the primary resources used in agricultural production and can involve either explicit or implicit costs. Explicit costs involve a cash outlay of some kind such as cash rent, hired labor costs, or interest on loans. Implicit costs do not involve outlays of cash and include costs such as owner labor and interest on owner equity. In most farm operations, the owner supplies a portion of the capital invested in the operation, but rarely does the owner supply all of the capital. Regardless of who supplies the capital — whether the owner, landlord, or the bank — all implicit and explicit costs must be considered when estimating economic costs. Owner-supplied labor, land, and machinery have opportunity costs associated with them, and these costs should be accounted for in an enterprise cost analysis. For example, the owner can always find some other use for his/her labor — perhaps working a second job in town. He or she also can find other uses for financial capital, such as investing it in the stock market or an alternative business venture. The cost of owner-supplied capital is the cost of opportunity forgone in its next best alternative use.

Table 1. Capital Investment for a Five Acre Colorado Spruce Plantation.

Description	1999 Purchase Price ($)	Useful Life (Years)	Amount Used	% to Spruce
Machinery				
15 hp 2wd tractor	3,600	15	100 hours	25
Rotary tiller	1,400	10	30 hours	20
Vehicles				
Pickup (3/4 ton)	26,500	6	12000 miles	10
Equipment				
Backpack sprayer	500	10	———	100
Pruning tools	200	10	———	100
Misc. tools and equip	2000	10	———	100
Land	5,000	———	———	100
Establishment costs	37,940	6	———	100
Total investment	$49,470	———	———	100

All resource costs in this study are accounted for, regardless of source, and valued at the prevailing market rate. Labor is supplied by both the owner and hired employees and valued at $12.00 and $7.00 per hour, respectively. Custom work is valued at local market rates. The labor rates include a base wage plus a percentage for Social Security, Medicare, unemployment insurance, and other labor overhead expenses.

Capital costs are charged for operating, intermediate, and long-term inputs. Interest on operating capital is charged from the time an input is employed until the month of harvest, or until the end of the operating year, if no harvest takes place that year and is valued at a nominal rate of 9.5 percent. Interest on intermediate inputs, such as machinery, is calculated at 10 percent. Interest on land and stand investment is valued at a risk-adjusted rate (real rate of 6 percent). An overhead cost of 2.5 percent of cash expenses also is charged to the operation to cover unallocated costs such as office expenses, legal and accounting fees, and utilities. Land is owned and valued at $1,000 per acre, and this translates into an annual opportunity cost of $60 per acre (6% x $1,000).

Labor Requirements

Production of Colorado Spruce requires an adequate labor supply to perform the tasks necessary to grow healthy, marketable trees. Considerable labor is required in the spring and early summer for pruning, spraying, fertilizing, and cultivating. Because tree appearance is important to landscapers and homeowners, growers must pay careful attention to tree shape and prune as needed. Pest management is another important consideration in growing marketable trees. Colorado Spruce trees are relatively pest free but require periodic checks for pests and occasional spot spraying to keep insect populations low. Diseases can be a problem during extended wet and warm periods, and may require fungicide applications for control. As trees become larger, air movement slows and shade becomes more prominent, making pests an increased concern. Vegetative management also is important to keep competition for nutrients and water at a minimum, especially when trees are young. Weed control is accomplished mechanically with cultivation and/or with applications of herbicide. The annual labor requirements listed in Table 2 below are considered typical for a five-acre Colorado Spruce specimen tree operation but will vary depending on growing conditions.

Establishment Costs

Since it takes several years to establish and grow trees to a marketable size, initial costs associated with establishment must be carried forward, eventually to be offset by future income. Therefore, the costs of establishing a specimen tree stand are spread over the harvest years. This is done by carrying forward, with interest, the total establishment costs for the initial, or preparation year, the planting, or establishment year, and the growing years. The total establishment costs for years 0 through 5 are amortized over the harvest life of the Colorado Spruce tree operation (6 percent for 6 years). These stand investment costs are identified under ownership costs in the tree costs and returns estimates for years 6 through 11 (see Tables B6 - B11 in Appendix B).

Costs and Returns Estimates

The costs and returns estimates (enterprise budgets) developed in this study for Colorado Spruce specimen trees were based on the model plantation described earlier. These include separate budgets for six years of establishment and six budgets representing six years of production, Tables B0-B11. Years 0-5 are characterized by high capital costs without income, where years 6-11 are characterized by ongoing growing costs and costs associated with tree harvests. All 800 trees per acre are dug and sold by the end of Year 11.

The costs in Appendix B, Tables B0-B11, are categorized as operating and ownership costs. Operating costs are the costs of the day-to-day maintenance and operations of the plantation. These costs include items such as fertilizer, chemicals, hired labor, fuel, and repairs. Ownership costs pertain to the cost recovery of capital investments lasting more than one year, such as machinery, vehicles, equipment, and land. These costs are depreciation, interest on investment, property taxes, and property insurance. Even if production does not take place, the costs associated with ownership still are incurred.

In the long run, returns must meet or exceed both operating and ownership costs for the tree plantation to be economically viable. When returns are just equal to the sum of operating and ownership costs (total costs), the enterprise is at break-even. The grower is recovering all out-of-pocket expenses and realizing a competitive return on his/her capital invested in land, machinery, equipment, and trees. If the break-even point is exceeded, the grower also earns a return to management and risk.

Years 0 - 5

The site is developed and prepared for planting in Year 0. Costs in this first year are incurred to make the site accessible by vehicle and tractor, to spray weeds and to cultivate the soil. Weed control is performed by the owner, whereas all cultivation is custom-hired. Total costs to develop and prepare the site are $916 per acre in Year 0 (Table B0, Appendix B).

In Year 1, Colorado Spruce seedlings are planted at a rate of 800 trees per acre. Before planting, rows are marked to increase planting and management efficiency. Weed competition is reduced by applying a pre-emergent herbicide the month before planting, and by cultivating between the tree rows in June and July. Rodent control measures also are taken and will continue through the

Table 2. Annual Labor Requirements for a Five Acre Colorado Spruce Specimen Tree Operation.

	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Yr. 7	Yr. 8	Yr. 9	Yr. 10	Yr. 11
	(hours per 5 acres)											
Pruning				35	75	100	225	225	225	225	150	—
Spraying	3	15	30	30	85	70	75	75	75	70	40	—
Fertilizing	—	—	10	10	10	10	10	10	10	5	5	—
Planting	—	73	3	3	3	—	—	—	—	—	—	—
Cultivating	2	35	35	35	30	30	—	—	—	—	—	—
Other	14	48	48	48	48	48	85	85	85	73	70	48
Total	19	171	126	161	251	258	395	395	395	373	260	48

final year of harvest. Total cost of establishing the Colorado Spruce plantation in Year 1 is $1,371 per acre as shown in Table B1.

The practices in years 2 through 5 generally are static, with the exception of pruning. Pruning labor becomes a factor in Year 2 and gradually increases through Year 5. Weed competition is reduced by spot spraying preemergent herbicides early in the spring each year and by cultivating in June and July. Insecticide is spot sprayed once in Year 2, and in both May and June in successive years. Fertilizer is applied annually by hand beginning in Year 2. It is applied in the fall in gradually increasing amounts from one ounce per tree in Year 2 to five ounces per tree in Year 5. Fungicides are spot sprayed in May and June for disease control starting in Year 4. Total costs in years 2 through 5, as shown in Tables B2 - B5, are: $973 per acre in Year 2; $1,147 per acre in Year 3; $1,531 per acre in Year 4; and $1,651 per acre in Year 5.

Years 6 - 11

Years 6 through 11 are the harvest years. Growing costs continue during this period, but vary little from Year 5, with the exception of increasing amounts of labor for pruning and one additional spot spray for insects. Growing costs gradually subside after Year 9 because most of the Colorado Spruce have been removed and sold. Digging starts in Year 6, but only 100 trees per acre are dug the first year to thin the stand. Trees gradually are removed and sold over the next five years with 100 trees taken in Year 7, 200 in Year 8, 200 in Year 9, 100 in Year 10, and 100 in Year 11. A custom digger ties the trees, digs them using a spade and tractor, and wraps the root ball burlap inside a wire basket. The trees are gathered in a close location that is accessible by truck. Custom digging costs are $32 per tree for small trees, but gradually increase with the size of the tree, topping out at $40 per tree for the larger trees in Year 11. The trees are marketed through a broker on commission (10 percent of gross value).

Total net establishment cost for years 0-5 is $7,588 per acre. This represents the total investment required to establish and maintain one acre of Colorado Spruce until the first year of harvest. The projected annualized cost of this investment, spread over six harvest years, is $1,544 per acre and includes stand depreciation plus interest on investment. This amount is calculated using the capital recovery approach shown in Appendix A and labeled as stand investment in Tables B6-B11.

Income from trees sold during the harvest years offsets the continued growing costs, harvest and marketing costs, and stand investment costs. Total annual costs, including all harvest and marketing costs, for years 6-11 are shown in Table 4b.

Economic Analysis

The analysis in Table 3, generated from Tables B0-B8, summarizes the first eight years of cash flows for an acre of Colorado Spruce trees grown in northern Idaho. As shown in Table 3, the enterprise does not generate a positive annual cash flow until Year 8. During that year, cumulative gross income exceeds cumulative cash costs. This is not to declare Year 8 as the economic break-even point; Year 8 simply is the year that initial out-of-pocket expenses are fully recovered.

A cash flow analysis is a good indicator of the cash requirements needed to establish an acre of Colorado Spruce specimen trees and when sufficient income will be available to recover initial cash investment. However, enterprise profit or the economic break-even point cannot be projected using a cash flow analysis because non-cash items, such as depreciation and interest on owner equity, are excluded.

Tables 4a and 4b are summaries of the economic costs presented in Tables B0-B11. They summarize projected gross income, total costs, net projected returns, and cumulative net returns. Total costs to establish Colorado Spruce trees (the sum of cumulative operating and ownership costs for years 0-5) are $7,588 per acre, as shown in the last column of Table 4a. Cumulative net returns are the sum of net projected returns and serve as an indicator of profit.

In this analysis of Colorado Spruce, net losses are projected to occur each year through Year 5 of establishment as shown in Table 4a. No income is earned before Year 6 to offset costs incurred during the establishment years. Net losses also are projected to occur the first two years of harvesting trees (years 6 and 7) as shown in Table 4b. Net losses in these years are due, in part, to the harvest of smaller trees that command a lower price, per foot, compared to larger trees harvested in years 8-11. Year 8 is the first year that gross income exceeds total costs, resulting in a net return that year; this continues through Year 11, as shown in Table 4b.

The economic break-even point occurs in the year that cumulative net returns become positive. This is the year when total costs of establishing the plantation ($7,588) are fully recovered. Table 4b shows the economic break-even point is reached by the 10th year of harvest. A graphical demonstration of the economic break-even point is shown in Figure 1. This means the plantation is an economically viable operation, given the costs and returns presented here. The grower realizes a competitive return on his/her capital invested in the plantation in addition to a return to his/her management and risk or profit. Table 4b shows a return to management and risk of $7,658 per acre.

The pie chart in Figure 2 shows the distribution of the establishment and production costs summarized in Tables 4a and 4b. Custom harvesting is the most significant plantation cost (48%), followed by stand investment, marketing, and labor. Stand investment represents 16% of plantation costs, marketing 11% and labor 9%.

Table 3. Cash Costs and Returns Per Acre, Colorado Spruce Specimen Trees (5 acre operation).

Item	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Gross income	$0	$0	$0	$0	$0	$0	$4500	$6000	$15000
Cash operating costs	652	1005	451	524	796	763	4553	4733	8836
Cash ownership costs	41	51	48	51	58	58	198	202	305
Total cash costs	693	1056	499	575	854	821	4750	4935	9141
Annual cash flow	-693	-1056	-499	-575	-854	-821	-250	1065	5859
Cumulative cash flow	-693	-1749	-2248	-2823	-3677	-4498	-4748	-3638	2177

Table 4a. Economic Costs and Returns of Establishing and Producing Colorado Spruce Specimen Trees in Northern Idaho (Preharvest Years 1 - 5).

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Totals
Gross income	$0	$0	$0	$0	$0	$0	$0
Cash operating costs	652	1,005	451	524	796	763	4,190
Total ownership costs	264	366	522	622	735	889	3,398
Total costs	916	1,371	973	1,147	1,531	1,651	7,588
Net projected returns	-916	-1,371	-973	-1,147	-1,531	-1,651	
Cumulative net returns	-916	-2,287	-3,260	-4,406	-5,937	-7,588	

Table 4b. Economic Costs and Returns of Establishing and Producing Colorado Spruce Specimen Trees in Northern Idaho (Harvest Years 6-11).

	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	*Totals
Gross income	$4,500	$6,000	$15,000	$18,000	$10,500	$12,000	$66,000
Cash operating costs	4,553	4,733	8,836	9,855	5,249	5,402	42,818
Total ownership costs	1,975	1,980	2,082	2,108	1,992	1,989	15,524
Total costs	6,528	6,712	10,919	11,962	7,242	7,391	58,343
Net projected returns	-2,028	-712	4,081	6,038	3,258	4,609	
Cumulative net returns	-9,616	-10,328	-6,247	-209	3,049	7658	

**Represents the total costs incurred for all 11 years, including those listed in 4a.*

Conclusion

Production, marketing, and financial risks are associated with growing specimen trees. Considerable time lags between planting trees and the realization of profits make financing a plantation difficult and risky. Because of the expense and risk associated with planting trees, potential growers should carefully assess the production and financial risks before committing capital resources. A thorough economic analysis is advisable.

The costs and returns estimates generated in Tables B0-B11 are based on the assumptions outlined in this study. They should be revised to reflect any changes in the conditions that might influence the underlying assumptions. Changes in input prices, specimen tree markets, labor availability, site conditions, cost of capital, and weather could have substantial influences on plantation profitability.

Figure 1. Cumulative Net Returns of Growing Colorado Spruce Trees in Northern Idaho (years 0-11).[1]

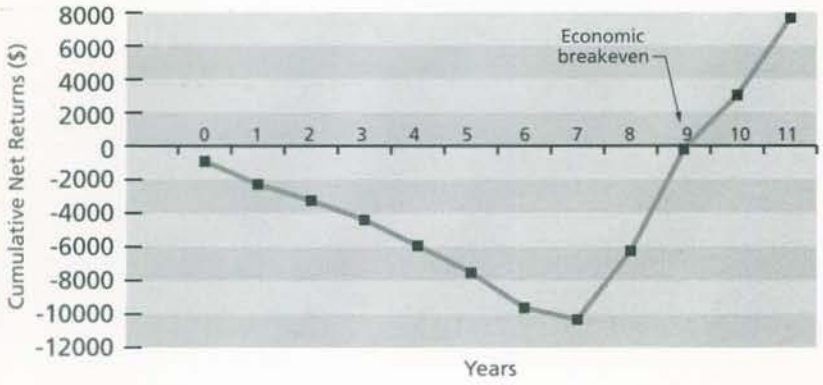
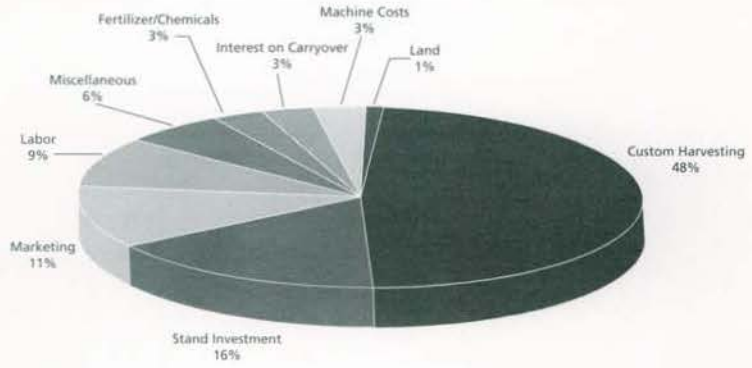


Figure 2. Cumulative Operating and Ownership Costs per Acre for Colorado Spruce Production (years 0-11).



[1] Economic breakeven occurs in the year when cumulative net returns reach zero. The economic breakeven point for the Colorado Spruce tree enterprise analyzed in this study is reached in Year 9 as shown above.

Appendix A. Ownership Cost Calculations

Ownership costs for an asset lasting more than one year must be allocated over its useful life to derive an annual ownership cost. Ownership costs include both the decline in value over time, based on expected use or obsolescence (depreciation) and the opportunity interest on the value of the asset. Ownership costs also include property tax and casualty insurance.

The following methods for calculating depreciation and interest and for calculating taxes and insurance are consistent with the recommendations of the National Task Force on Commodity Costs and Returns Measurement Methods sponsored by the American Agricultural Economics Association. Consistent with their recommendations, a real, rather than a nominal, interest rate is used for land and stand investment costs.

Depreciation and Interest

Depreciation and interest were calculated using the annual equivalent capital recovery technique. This method is recommended over the estimation technique using straight-line depreciation (repayment) plus return on the average investment.

$$\text{Depreciation and Interest} = B(a/p)^{i}_{n} - V(a/f)^{i}_{n}$$

where: B = initial investment
V = salvage value
i = interest rate in decimal form
n = years of useful life

$(a/p)^{i}_{n} = i(1+i)^{n}/[(1+i)^{n}-1]$ = uniform series end-of-period amount (a) equivalent to present sum (p); or capital recovery factor.

$(a/f)^{i}_{n} = i/[(1+i)^{n}-1]$ = uniform series end of period amount (a) equivalent to future sum (f);or sinking fund factor.

Source: Thuesen, H. G., W. J. Fabrycky, and G. J. Thuesen. 1971. Engineering Economy. New York: Prentice-Hall.

Taxes and Insurance

Insurance

The property tax and insurance cost calculations were made using rates of 1.0 and 0.6 percent, respectively, applied to the average level of investment.

Insurance = I[(B +V)/2]
where: B = initial investment
V = salvage value
I = insurance rate

Taxes = T[B+V/2]
where: B = initial investment
V = salvage value
T = personal property tax rate

Appendix B

Table B0. Costs and Returns Per Acre to Establish Colorado Blue Trees - Year 0 Site Preparation Year

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	0.00	each	0.00	0.00	
Total Gross Returns For Spruce Trees				0.00	
Operating Costs					
Other:					
Site development	1.00	acre	200.00	200.00	
Custom:					
Custom spray	1.00	acre	15.00	15.00	
Custom plow	1.00	acre	50.00	50.00	
Custom disk	1.00	acre	30.00	30.00	
Custom harrow	1.00	acre	15.00	15.00	
Herbicide:					
Roundup	48.00	oz	0.40	19.20	
Rodenticide:					
Rodent control	1.00	acre	15.00	15.00	
Labor (machine)	16.60	hrs	12.00	199.20	
Labor (non-machine)	3.00	hrs	7.00	21.00	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	4.72	gal	0.72	3.40	
Lube				4.76	
Machinery repair				20.96	
Interest on operating capital @ 9.50%				29.93	
Total Operating Costs/Acre				651.77	
Net Returns Above Operating Costs				-651.77	
Cash Ownership Costs					
General overhead				17.00	
Property taxes				17.29	
Property insurance				3.18	
Investment repairs				4.00	
Total Cash Ownership Costs/Acre				41.47	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				62.59	
Equipment				100.02	
Total Non-Cash Ownership Costs/Acre				222.61	
Total Costs/Acre				915.85	
Returns to Risk and Management				-915.85	

Table B1. Costs and Returns Per Acre to Establish Colorado Spruce Trees-Year 1 Planting Year

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	0.00	each	0.00	0.00	
Total Gross Returns For Spruce Trees				0.00	
Operating Costs					
Custom:					
Mark rows	1.00	acre	20.00	20.00	
Herbicide:					
Simazine	3.00	qt	4.30	12.90	
Goal	1.00	qt	27.92	27.92	
Trees:					
Trees	800.00	each	0.58	464.00	
Rodenticide					
Rodent control	1.00	acre	15.00	15.00	
Labor (machine)	16.60	hrs	12.00	199.20	
Labor (non-machine)	17.50	hrs	7.00	122.50	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	4.72	gal	0.72	3.40	
Lube				4.76	
Machinery repair				20.96	
Interest on operating capital @ 9.50%				85.93	
Total Operating Costs/Acre				1004.89	
Net Returns Above Operating Costs				-1004.89	
Cash Ownership Costs					
General overhead				26.00	
Property taxes				17.88	
Property insurance				3.39	
Investment repairs				4.00	
Total Cash Ownership Costs/Acre				51.26	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				62.59	
Interest on carryover				91.96	
Equipment				100.02	
Total Non-Cash Ownership Costs/Acre				314.57	
Total Costs/Acre				1370.72	
Returns to Risk and Management				-1370.72	

Table B2. Costs and Returns Per Acre to Establish Colorado Spruce Trees-Year 2

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	0.00	each	0.00	0.00	
Total Gross Returns For Spruce Trees				0.00	
Operating Costs					
Herbicide:					
Simazine	3.00	qt	4.30	12.90	
Goal	1.00	qt	27.92	27.92	
Trees:					
Trees	30.00	each	0.58	17.40	
Insecticide:					
Sevin	0.50	qt	8.14	4.07	
Fertilizer:					
18-5-10	50.00	lb	0.50	25.00	
Rodenticide					
Rodent control	1.00	acre	15.00	15.00	
Labor (machine)	16.60	hrs	12.00	199.20	
Labor (non-machine)	8.50	hrs	7.00	59.50	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	4.72	gal	0.72	3.40	
Lube				4.76	
Machinery repair				20.96	
Interest on operating capital @ 9.50%				32.15	
Total Operating Costs/Acre				450.58	
Net Returns Above Operating Costs				-450.58	
Cash Ownership Costs					
General overhead				12.20	
Property taxes				19.73	
Property insurance				4.05	
Investment repairs				12.00	
Total Cash Ownership Costs/Acre				47.98	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				85.37	
Interest on carryover				229.02	
Equipment				100.02	
Total Non-Cash Ownership Costs/Acre				474.41	
Total Costs/Acre				972.97	
Returns to Risk and Management				-972.97	

Table B3. Costs and Returns Per Acre to Establish Colorado Spruce Trees-Year 3

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	0.00	each	0.00	0.00	
Total Gross Returns For Spruce Trees				0.00	
Operating Costs					
Herbicide:					
Simazine	3.00	qt	4.30	12.90	
Goal	1.00	qt	27.92	27.92	
Trees:					
Trees	20.00	each	0.58	11.60	
Insecticide:					
Sevin	0.50	qt	8.14	4.07	
Fertilizer:					
18-5-10	100.00	lb	0.50	50.00	
Rodenticide					
Rodent control	1.00	acre	15.00	15.00	
Labor (machine)	16.60	hrs	12.00	199.20	
Labor (non-machine)	15.50	hrs	7.00	108.50	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	4.72	gal	0.72	3.40	
Lube				4.76	
Machinery repair				20.96	
Interest on operating capital @ 9.50%				37.45	
Total Operating Costs/Acre				524.08	
Net Returns Above Operating Costs				-524.08	
Cash Ownership Costs					
General overhead				14.40	
Property taxes				20.35	
Property insurance				4.27	
Investment repairs				12.00	
Total Cash Ownership Costs/Acre				51.01	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				85.37	
Interest on carryover				326.04	
Equipment				100.02	
Total Non-Cash Ownership Costs/Acre				571.43	
Total Costs/Acre				1146.53	
Returns to Risk and Management				-1146.53	

Table B4. Costs and Returns Per Acre to Establish Colorado Blue Spruce Trees-Year 4

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	0.00	each	0.00	0.00	
Total Gross Returns For Spruce Trees				0.00	
Operating Costs					
Herbicide:					
Simazine	3.00	qt	4.30	12.90	
Goal	1.00	qt	27.92	27.92	
Insecticide:					
Lindane	2.50	qt	15.57	38.93	
Fungicide:					
Bravo	4.00	qt	14.35	57.40	
Trees:					
Trees	10.00	each	0.58	5.80	
Fertilizer:					
18-5-10	200.00	lb	0.50	100.00	
Rodenticide					
Rodent control	1.00	acre	10.00	10.00	
Labor (machine)	15.50	hrs	12.00	186.00	
Labor (non-machine)	34.50	hrs	7.00	241.50	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	3.98	gal	0.72	2.87	
Lube				4.68	
Machinery repair				20.85	
Interest on operating capital @ 9.50%				58.84	
Total Operating Costs/Acre				795.99	
Net Returns Above Operating Costs				-795.99	
Cash Ownership Costs					
General overhead				20.80	
Property taxes				20.60	
Property insurance				4.36	
Investment repairs				12.00	
Total Cash Ownership Costs/Acre				57.75	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				85.37	
Interest on carryover				440.00	
Equipment				92.01	
Total Non-Cash Ownership Costs/Acre				677.38	
Total Costs/Acre				1531.13	
Returns to Risk and Management				-1531.13	

Table B5. Costs and Returns Per Acre to Establish Colorado Spruce Trees-Year 5

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	0.00	each	0.00	0.00	
Total Gross Returns For Spruce Trees				0.00	
Operating Costs					
Insecticide:					
Lindane	1.00	qt	15.57	15.57	
Sevin	0.50	qt	8.14	4.07	
Fungicide:					
Bravo	4.00	qt	14.35	57.40	
Herbicide:					
Roundup	12.00	oz	0.40	4.80	
Fertilizer:					
18-5-10	250.00	lb	0.50	125.00	
Rodenticide					
Rodent control	1.00	acre	10.00	10.00	
Labor (machine)	15.50	hrs	12.00	186.00	
Labor (non-machine)	36.00	hrs	7.00	252.00	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	3.98	gal	0.72	2.87	
Lube				4.68	
Machinery repair				20.85	
Interest on operating capital @ 9.50%				51.00	
Total Operating Costs/Acre				762.55	
Net Returns Above Operating Costs				-762.55	
Cash Ownership Costs					
General overhead				20.00	
Property taxes				21.57	
Property insurance				4.70	
Investment repairs				12.00	
Total Cash Ownership Costs/Acre				58.27	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				85.37	
Interest on carryover				592.90	
Equipment				92.01	
Total Non-Cash Ownership Costs/Acre				830.28	
Total Costs/Acre				1651.10	
Returns to Risk and Management				-1651.10	

Table B6. Costs and Returns Per Acre to Produce Colorado Spruce Trees-Year 6

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	100.00	each	45.00	4500.00	
Total Gross Returns For Spruce Trees				4500.00	
Operating Costs					
Custom:					
Custom dig trees	100.00	tree	32.00	3200.00	
Marketing:					
Brokerage fee	4.50	$	100.00	450.00	
Insecticide:					
Lindane	2.00	qt	15.57	31.14	
Sevin	0.50	qt	8.14	4.07	
Fungicide:					
Bravo	4.00	qt	14.35	57.40	
Herbicide:					
Roundup	12.00	oz	0.40	4.80	
Fertilizer:					
18-5-10	250.00	lb	0.50	125.00	
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	12.00	hrs	12.00	144.00	
Labor (non-machine)	67.00	hrs	7.00	469.00	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	1.62	gal	0.72	1.17	
Lube				4.42	
Machinery repair				20.69	
Interest on operating capital @ 9.50%				7.65	
Total Operating Costs/Acre				4552.65	
Net Returns Above Operating Costs				-52.65	
Cash Ownership Costs					
General overhead				116.00	
Property taxes				64.41	
Property insurance				3.19	
Investment repairs				14.00	
Total Cash Ownership Costs/Acre				197.60	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				96.76	
Stand investment				1544.02	
Equipment				76.86	
Total Non-Cash Ownership Costs/Acre				1777.64	
Total Costs/Acre				6527.90	
Returns to Risk and Management				-2027.90	

Table B7. Costs and Returns Per Acre to Produce Colorado Spruce Trees-Year 7

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	100.00	each	60.00	6000.00	
Total Gross Returns For Spruce Trees				6000.00	
Operating Costs					
Custom:					
Custom dig trees	100.00	tree	32.00	3200.00	
Marketing:					
Brokerage fee	6.00	$	100.00	600.00	
Insecticide:					
Lindane	2.00	qt	15.57	31.14	
Sevin	0.50	qt	8.14	4.07	
Fungicide:					
Bravo	4.00	qt	14.35	57.40	
Herbicide					
Roundup	12.00	oz	0.40	4.80	
Fertilizer:					
18-5-10	310.00	lb	0.50	155.00	
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	12.00	hrs	12.00	144.00	
Labor (non-machine)	67.00	hrs	7.00	469.00	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	1.62	gal	0.72	1.17	
Lube				4.42	
Machinery repair				20.69	
Interest on operating capital @ 9.50%				7.65	
Total Operating Costs/Acre				4732.65	
Net Returns Above Operating Costs				1267.35	
Cash Ownership Costs					
General overhead				120.40	
Property taxes				64.41	
Property insurance				3.19	
Investment repairs				14.00	
Total Cash Ownership Costs/Acre				202.00	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				96.76	
Stand investment				1544.02	
Equipment				76.86	
Total Non-Cash Ownership Costs/Acre				1777.64	
Total Costs/Acre				6712.30	
Returns to Risk and Management				-712.30	

Table B8. Costs and Returns Per Acre to Produce Colorado Spruce Trees-Year 8

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	200.00	each	75.00	15000.00	
Total Gross Returns For Spruce Trees				15000.00	
Operating Costs					
Custom:					
Custom dig trees	200.00	tree	32.00	6400.00	
Marketing:					
Brokerage fee	15.00	$	100.00	1500.00	
Insecticide:					
Lindane	2.00	qt	15.57	31.14	
Sevin	0.50	qt	8.14	4.07	
Fungicide:					
Bravo	4.00	qt	14.35	57.40	
Herbicide:					
Roundup	12.00	oz	0.40	4.80	
Fertilizer:					
18-5-10	250.00	lb	0.50	125.00	
Rodenticide					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	12.00	hrs	12.00	144.00	
Labor (non-machine)	67.00	hrs	7.00	469.00	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	1.62	gal	0.72	1.17	
Lube				4.42	
Machinery repair				20.69	
Interest on operating capital @ 9.50%				41.30	
Total Operating Costs/Acre				8836.30	
Net Returns Above Operating Costs				6163.70	
Cash Ownership Costs					
General overhead				223.00	
Property taxes				64.41	
Property insurance				3.19	
Investment repairs				14.00	
Total Cash Ownership Costs/Acre				304.60	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				96.76	
Stand investment				1544.02	
Equipment				76.86	
Total Non-Cash Ownership Costs/Acre				1774.64	
Total Costs/Acre				10918.54	
Returns to Risk and Management				4081.46	

Table B9. Costs and Returns Per Acre to Produce Colorado Spruce Trees-Year 9

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	200.00	each	90.00	18000.00	
Total Gross Returns For Spruce Trees				18000.00	
Operating Costs					
Custom:					
Custom dig trees	200.00	tree	36.00	7200.00	
Marketing:					
Brokerage fee	18.00	$	100.00	1800.00	
Insecticide:					
Lindane	2.00	qt	15.57	31.14	
Sevin	0.50	qt	8.14	4.07	
Fungicide:					
Bravo	4.00	qt	14.35	57.40	
Herbicide					
Roundup	12.00	oz	0.40	4.80	
Fertilizer:					
18-5-10	125.00	lb	0.50	62.50	
Rodenticide					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	12.00	hrs	12.00	144.00	
Labor (non-machine)	62.50	hrs	7.00	437.50	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	1.62	gal	0.72	1.17	
Lube				4.42	
Machinery repair				20.69	
Interest on operating capital @ 9.50%				53.70	
Total Operating Costs/Acre				9854.70	
Net Returns Above Operating Costs				8145.30	
Cash Ownership Costs					
General overhead				248.40	
Property taxes				64.41	
Property insurance				3.19	
Investment repair				14.00	
Total Cash Ownership Costs/Acre				330.00	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				96.76	
Stand investment				1544.02	
Equipment				76.86	
Total Non-Cash Ownership Costs/Acre				1777.64	
Total Costs/Acre				11962.34	
Returns to Risk and Management				6037.66	

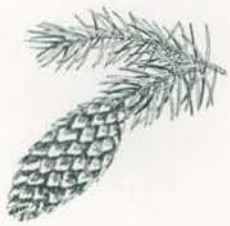


Table B10. Costs and Returns Per Acre to Produce Colorado Spruce Trees-Year 10

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	100.00	each	105.00	10500.00	
Total Gross Returns For Spruce Trees				10500.00	
Operating Costs					
Custom:					
Custom dig trees	100.00	tree	36.00	3600.00	
Marketing:					
Brokerage fee	10.50	$	100.00	1050.00	
Insecticide:					
Lindane	1.00	qt	15.57	15.57	
Sevin	0.50	qt	8.14	4.07	
Fungicide:					
Bravo	2.00	qt	14.35	28.70	
Herbicide:					
Roundup	12.00	oz	0.40	4.80	
Fertilizer:					
18-5-10	65.00	lb	0.50	32.50	
Rodenticide					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	12.00	hrs	12.00	144.00	
Labor (non-machine)	41.00	hrs	7.00	287.00	
Fuel - Gas	24.00	gal	1.18	28.32	
Fuel - Diesel	1.62	gal	0.72	1.17	
Lube				4.42	
Machinery repair				20.69	
Interest on operating capital @ 9.50%				22.96	
Total Operating Costs/Acre				5249.19	
Net Returns Above Operating Costs				5250.81	
Cash Ownership Costs					
General overhead				133.20	
Property taxes				64.41	
Property insurance				3.19	
Investment repairs				14.00	
Total Cash Ownership Costs/Acre				214.80	
Non-Cash Ownership Costs (Depreciation and Interests)					
Land				60.00	
Miscellaneous tools and equipment				96.76	
Stand investment				1544.02	
Equipment				76.86	
Total Non-Cash Ownership Costs/Acre				1777.64	
Total Costs/Acre				7241.64	
Returns to Risk and Management				3258.36	

Table B11. Costs and Returns Per Acre to Produce Colorado Spruce Trees-Year 11

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Spruce trees	100.00	each	120.00	12000.00	
Total Gross Returns For Spruce Trees				12000.00	
Operating Costs					
Custom:					
Custom dig trees	100.00	tree	40.00	4000.00	
Marketing:					
Brokerage fee	12.00	$	10.00	1200.00	
Labor (machine)	9.60	hrs	12.00	115.20	
Labor (non-machine)	0.00	hrs	0.00	0.00	
Fuel - Gas	24.00	gal	1.18	28.32	
Lube				4.25	
Machinery repair				20.64	
Interest on operating capital @ 9.50%				33.95	
Total Operating Costs/Acre				5402.35	
Net Returns Above Operating Costs				6597.65	
Cash Ownership Costs					
General overhead				137.00	
Property taxes				63.95	
Property insurance				3.03	
Investment repairs				14.00	
Total Cash Ownership Costs/Acre				217.98	
Non-Cash Ownership Costs (Depreciation and Interest)					
Land				60.00	
Miscellaneous tools and equipment				96.76	
Stand investment				1544.02	
Equipment				70.03	
Total Non-Cash Ownership Costs/Acre				1770.81	
Total Costs/Acre				7391.13	
Returns to Risk and Management				4608.87	

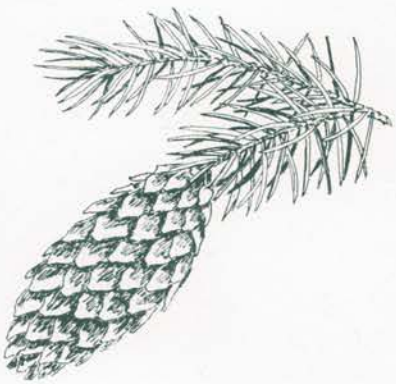


Illustration of Colorado blue spruce cone and branch by Lorraine Ashland, College of Natural Resources, University of Idaho.

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