

## Tree Crops for Marginal Farmland: Christmas Trees With a Financial Analysis

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### How To Use This Guide

This publication describes the most effective practices used to grow Christmas trees in the southern United States and the cost of those practices. It includes a financial analysis with typical costs and expected returns.

Only eastern white pine and Virginia pines are discussed in this guide. But other species, such as Scotch pine and Fraser fir, also can be grown profitably in some locations in the South. To use this publication to best advantage, read it straight through. Take special note of the cultural practices described and their estimated costs. Think about potential markets for the harvest. Read how to evaluate your potential investment, and think about the other benefits of tree crops. Read the case studies to get a better idea of how these investments can be evaluated. To conduct a financial analysis of your own situation, carefully estimate all the production costs, then take your estimates to the local Extension agent or farm management agent for assistance.

Throughout this publication, photographs can be accessed through the underlined links in specific sections. These are provided on separate pages due to the large size of some of the photos.

### Christmas Trees for Profit

Growing Christmas trees can be a profitable use for marginally productive farmland. Though more labor-intensive than other tree crops, a Christmas tree crop can return a profit in as little as six years. In addition, Christmas tree production requires little up-front capital investment. Most production operations require only hand tools or common farm machinery. Most industry

experts predict that Christmas tree markets will remain strong for at least the next few years. However, there is a surplus of Christmas trees in many regions of the United States. In order to be competitive, growers must efficiently produce high-quality trees of the species that consumers demand.

### Production Management

#### Site Selection

Not all marginal or abandoned farmland is suitable for Christmas trees. It is important that the ground is not too steep or rocky because you must have easy access for activities such as mowing and shearing. Cutover forestland is generally not suitable for Christmas trees because brush and tree sprouts generate too much competition.

Other soil and site factors such as drainage, fertility, pH, and ground cover are important. Suitable farmland for growing quality trees generally requires a level to gentle slope of not more than 10 percent, well-drained soil with no major nutrient deficiencies, no major surface rocks, and no woody vegetation.



Christmas tree production is a good use for small acreage and involves common farm equipment.

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## Site Preparation

Proper site preparation can make the planting process much easier and can result in greater tree survival. Also, it can greatly facilitate future cultural operations such as mowing and shearing. To prepare a site for planting, all rocks, logs, stumps, and brush should be removed. Heavy sod must be broken up, and all woody brush must be killed. If the soil has been compacted, it may need to be tilled or sub-soiled. Remaining vegetation can either be removed, plowed under, or treated with herbicides. Often, only tree rows are sprayed with herbicides, and the area between rows is mowed. It is very important to remove competing vegetation at this stage to avoid serious problems later.

## Tree Planting

Proper planting of tree seedlings is relatively easy. One person can hand-plant about 1,000 seedlings per day on a prepared site. A tractor-drawn machine planter with two workers can increase that planting rate ten-fold. But before planting, and after you've chosen a species, consider the following:

**Source of seedlings.** Order seedlings in the fall for a spring or winter planting. Seedling sources will vary among states, with some species available from public nurseries and others from private nurseries.

**Number of seedlings.** The required number of seedlings depends upon acreage and tree spacing. Most experienced growers adjust tree spacing to accommodate their equipment. For example, if you have a 4-foot-wide mower, the spacing between rows might be 6 feet. The spacing between trees within a row is often less than spacing between rows. Most Christmas tree plantation densities are 900 to 1,200 trees per acre. It is easy to underestimate the space required by mature trees.

**Plantation Layout.** Plan a continuous harvest and steady cash flow by planting a portion of your total acreage each year. For example, for a 12-acre plantation on a six-year acres per year.

## Weed Control

Weed control is critical, especially when trees are young. Weeds compete with Christmas trees for sunlight, moisture, and nutrients. They also harbor pests such as mice, and they make movement around the plantation more difficult. The two most common weed control methods are herbicides and mowing. Often,

growers will use both methods. Herbicide applications are made to control weeds in the row and mowing controls weeds between rows. Typically, pre-emergent herbicides are applied in late winter to early spring, followed by a full-spectrum chemical in the fall.



Good weed control is essential to producing quality Christmas trees.

Herbicides are applied with a backpack sprayer or a tractor-mounted power sprayer. An acre of Christmas trees can be treated with a backpack sprayer in two or three hours.

Two to five mowings are required per summer. Usually, walk-behind rotary or sickle-bar mowers or small tractors are used. It takes one to five hours to mow an acre, depending on the machine, terrain, obstacles, and quantity of vegetation.

## Shearing

Shearing is another critical operation in producing high-quality trees. The objective is to create a full, well-formed tree with a straight central stem and a conical taper of about 66 percent. Remove any dead or competing branches, prune the top of the tree to the desired height, and shear the sides of the tree to create the desired shape and density.



Shearing Christmas trees is one of the most important cultural treatments.

Shearing begins in the second or third year after planting and must be done each year thereafter. It is usually done in early summer within a fairly narrow four- to six-week window, depending on the growth stage of the needles. Most species require one shearing per year.

An exception is Virginia pine, which grows in a multiple-flush pattern. This requires from two to four shearings per year. While more labor-intensive, Virginia pine grows faster and may produce marketable trees two to three years before other species.

The most commonly used shearing tools are hand-held knives or rotary cutting heads powered by a small gasoline engine or electric battery. Depending upon tree size, one worker can shear an acre in one or two days. One worker using a knife can shear trees at about the same rate as another using a hand-held power tool.

## **Fertilization**

Fertilizing can benefit certain species on some sites. However, fertilizer is not typically applied each year to Christmas trees except to Fraser fir in Virginia, North Carolina, and Tennessee. Complete (NPK) fertilizers are sometimes applied if the trees appear deficient or if soil-testing indicates a low fertility level. Trees with the proper balance of nutrients have longer, greener foliage; better growth rates; and more resistance to insects, disease, and air pollution.

If needed, fertilizer is usually applied in the spring at about the time of bud break, when trees begin a growth spurt. Solid fertilizer is typically hand-spread in 3-foot-wide bands along the planting row. Fertilizer rates must be carefully controlled to prevent injury to the trees.

## **Pest Control**

Like any other crop, Christmas trees are susceptible to a wide variety of insect, disease, and animal pests. Some tree species are particularly susceptible to certain pests. Examples include tip moths on Scotch pine, Procerum root disease on white pine, and balsam woolly adelgid on Fraser fir. Deer, mice, voles, and rabbits also can damage trees.

Pest control should be considered only when the pest population has the potential to build up to a harmful level. Sometimes control methods involve the use of insecticides, fungicides, or rodenticides, while other times a biological control method is better. Always follow the principles of integrated pest management to employ the safest, least-cost, lowest impact treatment method.

## **Coloring**

Many growers apply a colorant to trees during the harvest year to enhance their appearance. Tree color often fades naturally after the first fall frost. Colorant, sprayed on the foliage with a backpack or power sprayer, imparts the deep green color that customers associate with healthy conifers. This practice is particularly common with white pine, Virginia pine, and some Scotch pine varieties.

One worker using hand equipment can spray an acre in approximately three days. Coloring is usually done in September and October, before the first frost. Only trees that are to be harvested should be colored, because new growth will require recoloring the following year.

## **Harvesting**

You may harvest and market your trees in several ways. If you market trees on a choose-and-cut basis, you may need to hire on-farm sales personnel. If you sell tree wholesale, you probably will be responsible for cutting, baling, moving trees to a roadside loading facility, and perhaps for loading the truck. All these tasks are very labor-intensive and must be done in a short period during November.

Not all the trees planted in a given year will be harvestable in the same year. Clearcutting an entire field is convenient but not practical. It may take three to four years to completely harvest a field because some trees grow faster than others.

You may also sell balled trees as live Christmas trees or nursery stock. With this option, smaller trees can be harvested. Also, the cost of shearing is less for trees sold as nursery stock. However, your field must have good, friable soil for digging, and you'll lose a small amount of valuable topsoil with every tree sent to market. In addition, trees to be sold for the nursery trade are not sheared as heavily as Christmas trees.

## Calendar of Silvicultural Practices

Common silvicultural practices for Christmas trees and the approximate time to perform them are listed here. Not all the practices are necessary to establish and maintain a healthy stand of trees for every situation.

<b>What</b>	<b>When</b>
Site preparation (can also be done in fall prior to planting) Apply pre-emergent herbicides (in some areas) Plant seedlings (in some areas) Fertilize established trees	<b>Early Spring</b>
Mow or spray around trees Watch for insects and diseases, and take necessary action	<b>Late Spring</b>
Shear trees Mow As necessary, spray to control disease and insects Begin to line up wholesale buyers for fall	<b>Early Summer</b>
Watch for disease and insects, and take necessary action Control grasses, weed, and brush Make preliminary inventory of saleable trees Plan advertising, order signs and other sale items Purchase liability insurance if your operation is retail or choose-and-cut Visit other tree farms Attend Growers Association meetings and other educational programs	<b>Mid- to Late Summer</b>
Check trees frequently for disease and insect damage Apply colorant Confirm harvesting labor availability Repair and maintain harvesting equipment Control grasses, weeds, and brush Repair access roads to plantation Measure and tag trees for harvesting and for cut-your-own sales Begin to advertise List unsold trees, greens, and wreaths with Christmas Tree Association sale bulletins Put up signs Order seedlings for next year	<b>Fall to Late Fall</b>
Advertise Harvest trees Market trees wholesale, choose-and-cut, or retail Pay bills Watch for poachers	<b>November-December</b>
Review your records and make plans for the new year, including lining up workers if you will need them Order the fertilizer, pesticides, small tools, and office supplies needed for next year Order seedlings and transplants Do accounts, taxes Update mailing lists of retail or wholesale customers Remove sheds and clear brush from plantings and roads Attend winter meetings of Christmas tree associations Apply pre-emergent herbicides (in some areas) Plant seedlings (in some areas)	<b>Winter</b>

## Financial Analysis

### Production Costs

Christmas tree production costs vary according to labor costs, equipment needs, tree species, and regional growing conditions. This section presents representative production costs and returns.

### Site Preparation

Site preparation costs depend upon the amount of preparation needed and the equipment used. Site preparation will require labor, herbicides, and spraying equipment. Costs range from \$20 to \$150 per acre. For very rough sites where a bulldozer is needed to remove rocks or stumps, costs could exceed \$200 per acre.

### Tree Planting

Tree-planting costs include the cost of seedlings, labor, and machinery (if a tractor is used). The cost of seedlings varies widely depending upon the state and whether seedlings are purchased from private or public nurseries. For example, commercially produced Fraser fir seedlings may cost \$750 per thousand, while white pine seedlings produced at a state nursery will be less than \$100 per thousand. Overall, planting costs range from \$70 to \$155 per acre.

It is often necessary to replant some areas where seedlings from the previous year's planting have died. Replanting costs are often somewhat higher than planting costs. Assuming a 10 percent mortality rate, replanting costs may range from \$10 to \$30 per acre.

### Weed Control

Controlling weeds usually involves both tractor-mowing and herbicide application. Costs can vary widely according to the number of mowings per year and the type of herbicide application used. Mowing costs range from \$20 to \$50 per acre, and herbicide application ranges from \$18 to \$45 per acre.

### Shearing

Shearing costs occur each year and will increase as the trees mature. For very young trees, shearing costs may be as low as \$30 per acre, but this cost may increase tenfold by the time trees are harvested. For a species such as Virginia pine, which requires multiple shearings per year, the cost will be much higher than with other species.

### Fertilization

Fertilization applications each year are not common, although some growers with low-productivity sites fertilize routinely. A complete fertilizer, such as 10-10-10, is most often used. Fertilizer and labor costs range from \$30 to \$45 per acre per application.

### Pest Control

Insecticide applications may range from \$30 to \$200 per acre depending upon the type of chemical and the number of applications needed. Costs for control of animal pests also vary widely. Fencing for deer may cost \$200 per acre.

### Coloring

Coloring is carried out by more growers each year because consumers demand attractive trees. Costs include colorant, labor, and spraying equipment. On average, coloring costs about \$250 per acre. Costs for large trees may approach \$1,500 per acre.

### Advertising

Placing ads in local newspapers or trade journals is necessary in harvest years. Costs for these activities are quite variable.

### Harvesting

The harvesting process involves selecting and tagging marketable trees, cutting, transporting to roadside, baling, stacking, and loading. If you sell wholesale trees, your obligations end at this point. If you wish to run your own retail operation, the cost of hauling the trees to a retail lot will be added. Harvesting can cost from \$0.50 to \$2.40 per tree. For an acre with 1,000 saleable trees, the cost ranges from \$500 to \$2,400.

### Returns

Christmas trees can be marketed in a number of ways. The three most common are wholesale, retail, and choose-and-cut. There are distinct advantages and disadvantages to each method. With the wholesale method, the grower only needs to deliver harvested trees to a roadside location. The retail method involves set up and maintenance of a temporary lot, usually in a town or city. Higher retail price must cover all additional costs, plus generate additional profit. Choose-and-cut sales operations allow customers to come to the farm,

select their own tree, and cut it down. This method does not require a retail lot but does require sales people and much customer assistance. Returns from choose-and-cut sales generally fall between those of wholesale and retail. Table 1 provides a general comparison of the three selling methods. Within a given region, the information in Table 1 may not be exactly accurate. For example, competition may vary greatly depending upon the number of growers in an area and their marketing methods.

Prices paid for Christmas trees sold by these different methods vary greatly depending upon tree species, size, and location. White pine and Virginia pine tend to be comparably priced for equal-quality trees, but species such as Fraser fir and blue spruce usually bring higher prices. Wholesale prices for pines often range between \$7 and \$12 for 7-foot trees. Choose-and-cut prices are higher, ranging from \$10 to \$25 per tree. Depending upon location, such trees on a retail lot may sell for \$25 to \$40 per tree. As a rule of thumb, retail lots in urban areas will have the highest priced trees.

**Table 1. Comparison of wholesale, choose-and-cut, and retail selling methods.**

	--- Selling Method ---		
	Wholesale	Choose-and-Cut	Retail
Price	low	high	high
Revenue	low	higher	high
Cost	low	high	high
Risk	low	low	high
Competition	low	high	low
Marketing area	large	limited	limited

## Evaluating the Investment

Tree crops are different from most agricultural crops due to the long growing time needed to return profits. Many factors, such as inflation and interest rates, will have very important effects on profitability. For example, inflation may result in future returns that appear large in today's dollars, but have low future purchasing power. Also, since interest rates are closely related to inflation, interest cost incurred or interest income foregone will vary with inflation rates. This is an important concern when considering investments that do not generate returns for many years.

Deciding whether Christmas tree production is a good investment will require careful consideration of production costs, expected returns, and how much your time is worth. After all, trees take much longer to grow than traditional crops, and your money will be invested for many years. You must be committed to many years of hard work before you earn any money, and put up with risks from insects, diseases, fire, and uncertain markets.

Returns must be discounted because a dollar to be received tomorrow is not worth the same as a dollar received today. Whether a bird in the hand today is worth more than two (or even three) in the bush tomorrow depends upon your time preference for money and your evaluation of risk. In investment analysis, you should choose the discount rate to reflect your preference for dollars today rather than dollars in the future. With an annual discount rate of 10 percent, you should be satisfied to receive one dollar today as one dollar and ten cents next year.

Here are three measures to analyze an investment:

- Present Net Worth (PNW) is similar to the term "profit." The effects of inflation on expected returns over costs are removed, and returns are discounted to the present. An investment with PNW greater than zero is profitable.
- Annual Equivalent Value (AEV) is the Present Net Worth expressed as a constant annual return throughout the investment period. The AEV can be used to compare a tree-crop enterprise with field-crop returns on the same site.
- Internal Rate of Return (IRR) is the rate at which discounted revenues just equal discounted costs. An investment has good potential if the IRR exceeds rates from alternative investments with similar risk, timing, and capital outlay.

## What Happened to Virginia Ham and Louis Gumbo

Here are the stories of Virginia Ham and Louis Gumbo, two farmers who planted Christmas trees on marginal farmland. Use their experience as a reference for estimating the cost of managing your plantation, but remember that no situation is ever "typical." Their costs are only estimates and will probably be different from your costs. See the Appendix for a detailed description of our assumptions.

## Virginia Ham and Her White Pine Christmas Trees

Virginia Ham owned a 200-acre farm in Southwest Virginia. Beef cattle did not provide enough income or employment for large family, so she decided to grow white pine Christmas trees on 20 acres of marginal cropland.

The site selected for the plantation was overgrown, but otherwise in good condition for tree planting. It cost Virginia \$53 per acre to kill brush and weeds with a herbicide application.

Seedlings cost 8.5 cents each. She chose to plant the trees at a 6-foot by 7-foot spacing, or about 1,000 per acre. Between labor and seedlings, tree planting cost \$161 per acre. Twenty percent of Virginia's seedlings died during the first year, so she had to incur replanting costs totalling \$36 per acre. She controlled weeds both with herbicides and mowing. In each of the first six years, she spent \$20 per acre on herbicide application. In years one, three, and five, she also hit the weeds hard with a broad-spectrum herbicide, which cost an additional \$45 per acre to purchase and apply. In years one through four, the cost of mowing three times each year was \$75 per acre, while in years five through eight she cut back to two mowings at a cost of \$50 per acre.

Shearing was carried out in years two through nine. Shearing costs varied by the size and number of trees, varying from \$13 per acre in year two to \$123 per acre in year seven.

Virginia felt that fertilizer would be necessary for the trees to grow well in her poor-quality soil, so she applied a complete fertilizer in years three, five, and seven. Each fertilizer application cost \$45 per acre.

Pest control was harder than Virginia had expected. She had to apply insecticides for white pine weevils in years three through nine and for aphids in years five, seven, and nine. In addition, all cut stumps were treated for pales weevils. Between the third and ninth years of her plantation, her pest control ranged from \$32 to \$204 per acre.

Virginia wanted her trees to look attractive to customers, so she applied colorant in the harvest years six through nine. Purchase and application of colorant cost \$75 to \$225 per acre.

The most desirable sales channel for Virginia was wholesale marketing, so she only spent a total of \$750

over years six through nine in harvesting, baling, and transporting marketed trees. She was able to sell 75 percent of the trees in her plantation at an average wholesale price of \$10.50 per tree.

Once her trees had been sold, Virginia wanted to see whether all her time and effort had been worthwhile. Was the Christmas tree plantation a good investment?

Over the growing period of Virginia's trees, inflation averaged 4 percent per year. Her marginal income tax bracket was 28 percent. She decided that 10 percent discount rate was a good estimate of her expected rate of return. Table 2 shows that her investment generated a profit after expenses and income taxes of \$1767 per acre. Considering her average cash expenditures of about \$400 per acre per year, she felt that this was a good return over expenses. Even if she had expected a higher rate of return on her investment, the Present Net Worth looks very favorable. The Internal Rate of Return of 38 percent shows that she would break even if she demanded a very high rate of return.

Comparing the average annual discounted return with row crops which could have been planted on the site, Virginia found that her investment returned \$332 per acre per year. Although her time and expenses were high compared to row crops, she felt this proved the shrewdness of her investment decision.

**Table 2. Financial analysis of white pine Christmas trees.**

	Discount Rate (%)				
	6	8	10	12	14
Present Net Worth (\$/acre)	\$2,433	\$2,076	\$1,767	\$1,503	\$1,273
Annual Equivalent Value (\$/acre)	\$392	\$361	\$332	\$303	\$274
Internal Rate of Return	38%				

## Louis Gumbo and His Virginia Pine Christmas Trees

Louis Gumbo was a farmer in central Louisiana who wanted a profitable alternative crop for his 400-acre farm. He decided to plant Virginia pine Christmas trees on some cropland which was not productive for field crops. The site selected was overgrown, but otherwise in good condition.

Louis spent \$53 per acre to control burn weeds with a herbicide. Seedlings cost 4.5 cents each, and all planting costs totalled about \$102 per acre. He lost 20 percent of his trees during the first year and replanted replacement seedlings at a cost of \$22 per acre.

Since Virginia pine trees reach marketable size in only five years, Louis concentrated on weed control with herbicides in the first two years after planting. He spent \$67 per acre per year on purchase and application of herbicides. Because Louisiana weeds grow fast, he mowed the plantation seven times per year at a cost of \$175 per acre per year.

Shearing was a major task for Louis. Virginia pine trees require multiple shearings each year. Louis's shearing costs ranged from \$35 per acre to \$150 per acre.

Louis felt that his trees needed fertilizer every year, so he applied a complete fertilizer. His annual expense for purchase and application ranged from \$15 per acre to \$44 per acre.

In Louisiana, major Christmas tree pests include pine tip moths and needlecast disease. Louis had some trouble with both of these pests, spending \$34 to \$211 per acre on pest control.

Some of Louis's trees reached marketable size in year four, so Louis applied colorant at a cost of \$250 per acre. He applied colorant to the remaining trees before they were harvested in year five.

Harvest expenses delivering trees to the wholesale delivery point were \$367 per acre per year. Louis was able to market 75 percent of his trees at \$10.50 per tree. Total returns for tree sales were just over \$7,000.

Like Virginia, Louis wondered whether his investment had paid off. He also considered that inflation had averaged 4 percent per year, that his income tax bracket was 28 percent, and that 10 percent was a good estimate of his expected rate of return on investments.

Table 3 shows that Louis's investment paid a healthy return. With a 10 percent discount rate, the Present Net Worth of his investment was \$1,818. He had spent just over \$3,700 and had received just over \$7000 in returns. Considering the number of years his money was invested, Louis was well satisfied with his profit. The breakeven rate of return, represented by the Internal Rate of Return, reflects this profitability. Any alternative investment of this amount, length of investment

and riskiness would have to pay a high rate of return to compete with his Christmas tree investment. Louis knew of no row crop in the site that could have returned \$500-\$600 per acre above costs as indicated by the Annual Equivalent Value.

**Table 3. Financial analysis of Virginia pine Christmas trees.**

	Discount Rate (%)				
	6	8	10	12	14
Present Net Worth (\$/acre)	\$2,174	\$1,988	\$1,818	\$1,662	\$1,519
Annual Equivalent Value (\$/acre)	\$627	\$600	\$574	\$547	\$521
Internal Rate of Return	63%				

As a word of caution, it is not valid to directly compare the investments of Louis and Virginia. Each had different costs and growing conditions. An important difference is the length of their investment. Because of favorable growing conditions, and the multiple-flush habit of Virginia pine, Louis could market trees in only four years. Thus, he could turn his money over faster. Market conditions, the cost of production practices, and growing conditions should be considered carefully when selecting a tree species.

## Evaluating Alternative Tree Crops on Your Farm

Dollar returns and rates of returns are important. But they aren't the sole criteria in deciding whether to invest in a tree crop. Your decisions will be based on many factors. These include market conditions in your area, how quickly you need a return on investment, and how much time and effort you wish to put into managing a crop that will take four to eight years to mature. You'll need to consider farm resources such as growing conditions, investment capital, labor costs, and your own management ability. Only you know how your money and time are best spent.

The choice between tree crops also depends on the farm's resource base. For example, a particular species may offer a relatively high return per acre but requires a sizeable amount of up-front investment capital to establish the stand. If investment capital is a major concern, then a tree crop such as white pine for timber may

be the best alternative. White pine does not generate as high a dollar return per acre. But it may well give a higher return on your investment capital than more highly valued trees.

Finally, risk should be considered. Numerous production problems such as weather, disease, and insects can reduce the productivity of a stand. Also, costs vary widely. While trees are less risky than many agricultural crops, lost income can be considerable if a total disaster occurs. You may want to work through a few examples yourself, varying price and production levels, to get a feel for the risk inherent in the tree crop.

Use Table 4 for information regarding the many factors that should be considered in the decision to grow a particular tree crop.

**Table 4. Information sources for tree crops selection.**

<b>Factor</b>	<b>Information Source</b>
Geographic range of the tree crop	County Forester
Site conditions--suitability for tree crop	County Forester
Local market conditions	County Forester, Extension Agent
Initial Investment cost	County Forester
Time and effort required to grow the crop	County Forester
Soil conservation, wildlife, and other benefits desired	County Conservationist, Extension Agent
Insect and disease problems	County Forester, Extension Agent
Cost share programs	County Forester, ASCS Office
Harvesting and marketing	Private forestry consultants, State Growers Associations

## Other Benefits of Tree Crops

This guide has emphasized only the financial returns of tree crops. There are additional benefits and intrinsic values that result from planting trees. For example, wildlife are attracted to trees of all ages. Both game and non-game species of animals utilize plantations. A planting arrangement that increases habitat for wildlife can increase animal populations without a sacrifice of tree production.

Trees also prevent soil erosion. Eliminating soil loss enhances land productivity and water quality. By stopping sediment from entering the streams, your water resources will be cleaner and therefore more suitable for fish and other aquatic species. Finally, tree crops screen the air and serve as a noise barrier. Again, proper design can maximize these benefits from your tree crop.

Moreover, most people enjoy the natural beauty only a tree or a forest can display. The Chinese say, "Keep a green tree in your heart and perhaps the singing bird will come."

Plant a tree crop today -- and enjoy the many benefits for years to come.

## Appendix

### Assumptions for Economic Analyses

	Virginia Ham White Pine (\$/acre)	Louis Gumbo Virginia Pine (\$/acre)
Site preparation	\$53 Hand-sprayed herbicide: \$33 labor \$20 herbicides	\$53 (same as white pine)
Tree planting	\$161 6 ft. by 7 ft. spacing, or 1,037 trees per acre. Labor costs: \$73 Seedling costs: \$88	\$102 7 ft. by 7 ft. spacing, or 889 trees per acre. Labor costs: \$62 Seedling costs: \$40
Replanting	\$36 80% survival rate in first year. Replacement of 208 trees/acre. Labor costs: \$18 Seedling costs: \$18	\$22 80% survival rate in first year. Replacement of 178 trees/acre. Labor costs: \$15 Seedling costs: \$7
Weed Control Herbicide	Pre-emergent application in years 1-6 and broad-spectrum application in years 1, 3, and 5. Years 1,3,5: cost = \$65 Years 2,4,6: cost = \$20	Pre-emergent and broad-spectrum application in years 1 and 2 only, for a cost of \$67.
Mowing	3 mowings per year in years 1-4, and 2 mowings per year in years 5-9. Years 1-4: cost = \$75 Years 5-9: cost = \$50	7 mowings each year. Annual cost of \$175.
Shearing	Depends upon labor, size of trees, and number of trees. Year 2: cost = \$12 Year 3: cost = \$45 Year 4: cost = \$59 Year 5: cost = \$12 Year 6: cost = \$124 Year 7: cost = \$157 Year 8: cost = \$125 Year 9: cost = \$60	Depend upon labor, size of trees, and number of shearings. Year 1: cost = \$35 Year 2: cost = \$100 Year 3: cost = \$150 Year 4: cost = \$90 Year 5: cost = \$45
Fertilizing	Application of 200 lb./acre of 10-10-10 in years 3, 5, and 7 at a cost of \$45	300 lb./acre of 8-24-24 applied in year 1, followed by annual applications of complete fertilizer Year 1: cost = \$44 Year 2: cost = \$18 Year 3: cost = \$29 Year 4: cost = \$15 Year 5: cost = \$15

Pest Control	<p>Application of insecticides for aphids in years 5, 7, and 9 at a cost of \$0.20 per tree; applications for white pine weevils in years 3-9 at a cost of \$0.04 per tree; and applications to all cut stumps for pales weevils at a cost of \$0.04 per tree.</p> <p>Year 3: cost = \$36  Year 4: cost = \$34  Year 5: cost = \$204  Year 6: cost = \$38  Year 7: cost = \$190  Year 8: cost = \$32  Year 9: cost = \$52</p>	<p>Application of insecticides for pine tip moth and fungicides for needlecast disease.</p> <p>Year 1: cost = \$34  Year 2: cost = \$74  Year 3: cost = \$211  Year 4: cost = \$211  Year 5: cost = \$211</p>
Coloring	<p>\$0.75 per tree</p> <p>Year 6: cost = \$75  Year 7: cost = \$188  Year 8: cost = \$225  Year 9: cost = \$75</p>	<p>\$0.75 per tree</p> <p>Year 4: cost = \$50  Year 5: cost = \$25</p>
Harvesting	<p>Trees are harvested in years 6-9, with costs incurred for cutting (\$0.20/tree), baling (\$0.50/tree) and transporting to loading area (\$0.25/tree).</p> <p>Year 6: cost = \$100  Year 7: cost = \$250  Year 8: cost = \$300  Year 9: cost = \$100</p>	<p>Trees are harvested in years 4 and 5, with same costs as for white pine.</p> <p>Year 4: cost = \$367  Year 5: cost = \$367</p>
Returns	<p>Trees are sold wholesale at a price of \$10.50 per tree; 75% of trees are saleable.</p> <p>Year 6: return = \$1,050  Year 7: return = \$2,625  Year 8: return = \$3,150  Year 9: return = \$1,050</p>	<p>Same conditions as white pine.</p> <p>Year 4: return = \$3,497  Year 5: return = \$3,507</p>

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