

Tree Crops for Marginal Farmland: Loblolly Pine

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Introduction

Agriculture in the southeastern United States has been able to recover from the much-publicized farm crisis of the early 1980's. Farm income in the 13 states of the Southeast has risen steadily since the mid-1980's. With a higher rural and farm population than many other regions, a strong agriculture will continue to be important to the future of the Southeast.

Many producers would like to increase farm income and decrease income variability. This has caused a growing number of farmers to investigate new and diversified sources of income. A resource which has not been tapped to its full potential is marginal farmland, specifically its use for growing tree crops. There are over 30 million acres of woodland and idle pasture and cropland on the Southeast's farms, and much of this land could be producing valuable tree crops.

The Tree Crops for Marginal Farmland Project seeks to provide farmers with basic information about growing and marketing tree crops. Tree crops have many advantages for farmers with marginal or unused land. The cost of inputs is relatively low, economic returns may be quite competitive with alternatives, and there are important environmental benefits.

There are five introductory guides in this series, and each has an accompanying videotape. They provide information on a specific tree crop which can be grown on small or medium-sized tracts of marginal or unused farmland. All these crops are common to areas of the southeastern United States, but their economic potential should be investigated by farmers. The tree crops chosen for this series are:

- White Pine for Timber
- Black Walnut for Timber and Nuts
- Loblolly Pine for Timber
- Royal Paulownia for Timber
- White and Virginia Pine for Christmas Trees

Your decision to grow a tree crop should be made only after careful consideration of the growing time, expense requirements, market conditions, expected returns, and your personal objectives. These guides will help you make your decision. In addition, you should seek information from representatives of organizations such as your state Forestry Service, your local Cooperative Extension office, and private consultants.

How to Use This Guide

This guide describes the most effective practices used to grow loblolly pine trees in the southern United States and the cost of those practices. It includes a financial analysis which uses typical costs and expected returns to evaluate a representative investment.

To use this guide 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. Next, read the case study, "Old McDonald's Tree Farm," 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.

Loblolly Pine: Description and Uses

Throughout the South, there is more timberland -- at least 182 million acres -- than cropland and pasture combined. Approximately one-third of the South is covered with pine trees. There are 41 million acres in natural pine stands and 21 million acres in planted pine stands. Loblolly pine is by far the most abundant species. Its natural range includes the 12 southern states from Texas to Virginia, as well as Maryland and Delaware.

Loblolly pine has spread remarkably in the Southeast, growing quickly and forming pure stands in abandoned agricultural fields. For this reason, it is also known as "old field pine."

The early colonists called a moist depression, swamp, or mudhole a "loblolly." Hence, pine that flourished in such an environment acquired this not-too-flattering name, even though it grows equally well on drier, inland soils.

There are several good reasons to consider a loblolly pine plantation. The soils of the Southeast are quite sandy and often low in the nutrients required for hardwood growth or agricultural crops, but loblolly pine grows well in such soils. Land suitable for loblolly often has few profitable alternative uses. In addition, there are many soil and wildlife conservation and other benefits of woodlands. Loblolly pine grows more rapidly than any other southern yellow pine species. On an average site, it would reach 55-65 feet in 25 years.

Loblolly pine cannot compete successfully for sunlight, moisture, and nutrients with hardwood species. However, in the South, fires are common, and the loblolly's resistance to fire damage gives it an edge over hardwoods.

Loblolly pine is grown for products such as sawlogs and pulpwood and is the primary species used by the paper industry. More than half of the U.S. wood pulp supplies come from southern pines, of which a large portion is loblolly.

The U.S Forest Service in 1987 projected a 40 percent increase in pine pulpwood needs by the year 2030. The Forest Service predicts that by the year 2000 half of southern softwood inventory will be in pine plantations.

Production Management

Site Selection

Loblolly pine grows on a wide variety of soils but grows best in deep surfaced soils with fine-textured subsoils. Pure stands develop on the lower, moist sites (especially river bottoms), and on drier, inland soils. Loblolly pine also grows aggressively on cutover sites. Overgrown fields are ideal sites for loblolly pine plantations.

Site Preparation

Even if your land is suitable for growing loblolly pine, you may need to prepare the site before planting or seeding the stand. If you properly prepare the site, more young trees will survive. Control vegetation so it doesn't rob nutrients, sunlight, and moisture from the young trees. Vegetation can be chopped, plowed, burned, or eradicated with herbicides. If only a few hardwood trees are growing on the site, you may wish to girdle or inject the trees with chemicals to kill them. Also, you may be able to sell products like firewood or pulpwood from these hardwood trees. Herbicides can be broadcast to kill larger concentrations of hardwoods. Check with your Extension agent or forester for proper herbicide types, amount, and handling.

You can also improve the young trees' chances with mechanical site preparation. Existing vegetation can be eradicated by slashing, shearing, piling, raking, chopping, or crushing. Use disking, bedding, and ripping to improve the soilbed when appropriate. You want to remove debris, reduce competition, and improve soil physical properties to enhance plantation establishment and to make future silvicultural operations more convenient. To minimize soil loss, any mechanical site preparation methods must be employed with caution on slopes with erodible soils.

Tree Planting

Two methods of establishing a loblolly pine plantation are seeding directly or planting seedlings. Planting seedlings is more common. Even though planting seedlings costs more than direct seeding, higher yields make the investment worthwhile. Use genetically improved seedlings from local nurseries.



Machine planting of pine seedlings is a fast, inexpensive way to establish a plantation.

Direct seeding usually costs less than planting seedlings. If successful, direct seeding will establish a uniformly stocked stand, which translates to a more productive stand in the future.

However, direct seeding is often unsuccessful. Poor weather conditions (drought or floods), excessive brush, or seed-eating wildlife can prevent good stand regeneration. Reseeding may be necessary, which will increase costs. Even if the seeds grow successfully, stocking is not as uniform or predictable as planting seedlings.

Weed and Pest Control

If trees are kept free of disease and competing trees or vegetation are controlled, loblolly pines will grow rapidly. But disease and hardwood competition are a threat to your pine plantation. Loblolly is a host for three species of pine bark beetles and can fall victim to infestations from fusiform rust. Hardwood trees that invade pine stands must be controlled. Studies indicate that early control of hardwoods is crucial for later pine growth. Each square foot of hardwood basal area in hardwoods will likely reduce pine basal area by at least that amount.

Prescribed burning is an inexpensive method to reduce competing hardwoods and other vegetation. Prescribed burning can help to:

1. reduce accumulation of litter and decrease fire hazard;
2. control hardwoods;
3. expose mineral soil on the site for better seed germination;
4. increase forage and browse availability for wildlife;
5. provide disease control; and
6. improve site accessibility and visibility.

Low-intensity burning can control hardwood stems under 3 inches in diameter. Do not burn for about 10 years, when the young trees have closed their canopy and have reached a height of about 20 feet. If trees are shorter, their crowns may be damaged by fire. Summer burning is best. A prescribed burn needs to be planned well ahead of time, and you will need professional advice. A poorly conducted burn can be very expensive.

Financial Analysis

Production Costs

Clearcutting, site preparation, and planting may cost \$50-\$200 per acre. Broadcast herbicides cost about \$25-\$70 per acre. Costs depend on the amount of brush to be eradicated, the herbicide used, and as site accessibility. Prescribed burning to control brush can cost \$5-\$15 per acre, depending upon the area to be burned, the fire lines established, and the amount of brush present.

Markets and Returns

Prices for sawtimber and pulpwood vary with location. In areas with active sawtimber markets and good prices, a longer rotation that produces larger diameter trees may be desirable. In areas with higher pulpwood prices, shorter rotations and closer spacing may be more profitable.

Stumpage prices are better for sites close to mills. In 1987, southern pine sawtimber average prices were \$115 per thousand board feet (Scribner Scale), and pulpwood prices averaged \$14 per standard cord. The average price of pine chip-and-saw, an intermediate product between pulpwood and sawtimber, was \$31 per standard cord in 1987. Prices nearly double the average were common in active markets such as southeastern Georgia and northern Florida.

Evaluating Your 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 loblolly pine 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.

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 just as pleased to receive one dollar today as one dollar and ten cents next year.

Here are three measures to analyze an investment:

Present Net Worth

Present Net Worth (PNW) is similar to the term “profit.” The effects of inflation on expected returns over costs are accounted for, and returns are discounted to the present. An investment with PNW greater than zero is profitable.

Annual Equivalent Value

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

The 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.

Old McDonald’s Tree Farm

Back when Old McDonald was young, he had an unproductive field in which he decided to plant loblolly pine. Site preparation included chemical and mechanical clearing and cost \$150 per acre.

He planted 500 trees per acre. Seedling and planting costs were \$50 per acre. He carried out a prescribed burn on the site in the 14th year and every third year after that at a cost of \$10 per acre, per burn.

Old McDonald performed a commercial row thinning in the 18th year, leaving a basal area of 85 square feet per acre. He sold the timber for \$270 per acre but paid about 10 percent in marketing costs. By the 25th year, the average tree was 60 feet tall. He sold the timber in the 28th year for a little more than \$1,200 per acre and paid 8 percent in marketing costs.

Table 1 shows the financial analysis results for Old McDonald. Over the 28-year growing period, inflation averaged 4 percent. Old McDonald estimated that a 10 percent discount rate was a good estimate of his expected rate of return on investment and that his federal income tax bracket was 29 percent.

Was the loblolly investment profitable? Consider the low investment and labor requirements, the Present Net Worth of \$176 per acre at a 10 percent discount rate was good. The investment generated at least a small profit at all displayed discount rates. The Internal Rate of Return indicated that the investment at least broke even up to a 17 percent discount rate. This IRR compared favorably to returns on investments of equal risk and similar time and cash requirements. In annual average terms, the AEV was \$19 at a 10 percent discount rate. If a low rate of return were acceptable, the AEV could equal \$40 per acre of more.

For producers with access to good markets, the results indicate a good return for a small dollar and labor investment.

Table 1. Old McDonald’s financial measures (after income taxes).

	Discount Rate (%)				
	6	8	10	12	14
Present Net Worth (\$/A)	548	316	176	91	39
Annual Equivalent Value (\$/acre)	41	29	19	11	6
Internal Rate of Return	17%				

Evaluating Alternative Tree Crops on Your Farm

Dollar returns and rates of returns are important. But they are not the sole criterion in deciding whether to invest in a tree crop. Your decision 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 the crop. 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 or loblolly pine may be the best alternative for the site. White pine or loblolly pine do not generate a high dollar return per acre. But they may well give a higher return on our investment capital than more highly valued trees (e.g., black walnut).

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

Once you have decided which tree crops to consider, you need to come up with the necessary data to conduct your financial analysis. Your local Cooperative Extension agent or farm management agent will be able to help.

Federal and State Cost-Share Programs

If you want to raise a tree crop on our farm, investigate federal or state cost-share programs. In most counties, some money is available for forestry activities such as site preparation, tree planting, fire protection, erosion

Table 2. Information sources for tree crops selection.

Source	Information Factor
Geographic range of the tree crop	County Forester, Extension Agent
Site conditions - suitability for tree crop	County Forester, Extension Agent
Local market conditions	County Forester, Extension Agent
Initial investment cost	County Forester, Extension Agent
Time and effort required to grow the crop	County Forester, Extension Agent
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, Extension Agent

control, and timber stand improvement. To find out what is available in your county, contact your county forester, Extension agent, or local Agricultural Stabilization and Conservation Service (ASCS) representative. Federal programs such as the Agricultural Conservation Program, Forestry Incentives Program, and Conservation Reserve Program may provide funds in your area. The new Forest Stewardship Incentives Program may also interest you if you want to enroll the farm into a long-term natural resources management plan.

Cost-share funds imply reduce your cost of forestry activities. For example, a 50 percent cost-share on seedlings and tree planting may reduce the cost from \$60 per acre to \$30 per acre. Direct payments from programs such as the Conservation Reserve Program provide income in early years before timber revenue begins.

As a word of caution, you cannot expect to receive federal funds from two different programs for the same activity. There are some state programs which also

provide assistance for farmers and woodland owners. Your local county forester is the best source of advice on state programs.

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 wood production.

Trees also prevent soil erosion. Eliminating soil loss enhances land productivity and water quality. By stopping sediment from entering 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 provide. 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 Used for Old McDonald's Financial Analysis

Item	Assumption
Site index	60 ft at age 25
Planting density	500 trees/acre
Seedling and planting cost	\$50/acre
Herbicide application	\$25/acre
Prescribed burning	\$10/acre per burn
Age at thinning	18 years
Age at harvest	28 years
Marketing expense	10% at thinning
	8% at final harvest
Marginal income tax rate	28%
Inflation rate	4%/year
Tax treatment	Reforestation credits for planting, all else ordinary income/expenses
Stumpage diameter ranges	Pulpwood: 4-7 in.
	Chip-n-saw: 8-11 in.
	Sawtimber: 12 in. or more
Stumpage prices	Pulpwood: \$13.99/cord
	Chip-n-saw: \$31.42/cord
	Sawtimber: \$115/thousand board foot
	Pulpwood top and cull: \$10/cord

Growth and financial measures were estimated with YIELDplus 2.1, a microcomputer-based timber yield forecasting and planning tool developed by the Tennessee Valley Authority. For further information, call (615) 494-9800, or write to:

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