

Tree Crops For Marginal Farmland

Loblolly Pine

With a Financial Analysis



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Tree

Crops for Marginal Farmland

Many producers would like to increase farm income and decrease income variability. A growing number of farmers are investigating 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. More than 30 million acres of woodland and idle pasture and cropland exist on Southeast 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, and economic returns may be quite competitive with alternatives. Marginal lands converted from annual rowcrop and pasture production to tree crops can reduce soil erosion, improve water quality, reduce total pesticide and fertilizer applications and produce more profitable returns for the landowner.

Five introductory guides are available 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 evaluated. 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 Agricultural Extension Service office and private consultants.

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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. A financial analysis is included 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 your local Extension agent or farm management agent for assistance.

Loblolly Pine: Description and Uses

Throughout the South the amount of timberland — about 182 million acres — exceeds the amount of cropland and pasture combined. Approximately one-third of all land in the South is covered with pine trees. Loblolly pine is by far the most abundant pine 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. Loblolly pine grows well in such soils. Land suitable for loblolly often has few other profitable agricultural uses. Loblolly pine grows more rapidly than any other southern yellow pine species. On an average site, loblolly pine will 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 U.S. wood pulp supplies come from southern pines, of which a large portion is loblolly.



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

Production Management

Site Selection

Loblolly pine is a “plastic” species with the ability to grow on a wide variety of soils, but it grows best in deep soils with fine-textured subsoils. Pure stands will develop on low, 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 loblolly pine, you may need to prepare the site before planting or seeding the stand. If the site is properly prepared, more young trees will survive. Control vegetation so it does not deprive young trees of nutrients, sunlight and moisture. 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. Make sure that Best Management Practices (BMPs) are followed. 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.

Direct seeding usually costs less than planting seedlings. If successful, direct seeding will establish a uniformly stocked



A young pine stand grows rapidly if weeds are controlled. A plowed firebreak can help protect the plantation from devastating wildlife.

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. Control of competing vegetation is essential. 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

Loblolly pine will grow rapidly if trees are kept free of disease and competing hardwood vegetation is controlled. 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 early control of hardwoods is crucial for later pine growth. Each square foot of hardwood basal area is likely to reduce pine basal area by at least that amount. Basal area (stem cross-sectional area) is a measure of the density of trees per unit land area.

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, until the young pine 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.



A thinned plantation keeps the trees growing at an optimal rate.

Financial Analysis

Production Costs

Clearcutting, site preparation and planting may cost \$50 to \$200 per acre. Broadcast herbicides cost about \$25 to \$70 per acre. Costs depend on the amount of brush to be eradicated, the herbicide used and site accessibility. Prescribed burning to control bush can cost \$5 to \$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 1998, southern pine sawtimber average prices were \$330 per thousand board feet (Doyle Scale), or \$35 per ton, and pulpwood prices averaged \$15 per ton. The average price of pine chip-and-saw, an intermediate product between pulpwood and sawtimber, was \$20 per ton. Prices nearly double the average were common in active markets such as southeastern Georgia, northern Florida and southern Alabama and Mississippi.

Evaluating Your Investment

Tree crops are different from most agricultural crops because of 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 forgone will vary with inflation rates. This is an important concern when considering investments that do not generate returns for many years.



Pines can be harvested using conventional chain saws, or with maneuverable fellerbunchers shown here.

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 10 cents next year.

Three measures to analyze an investment are:

- 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 (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.

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 was \$40 per acre. He planted 500 trees per acre. Seedling and planting costs were \$65 per acre. A herbicide treatment to release pines from competing vegetation was conducted at age 3 for \$70 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 \$1,260 per acre, but paid about 10 percent in mar-

keting 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 \$2,260 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 3 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 28 percent.

Was the loblolly investment profitable? Considering the low investment and labor requirements, the Present Net Worth of \$183 per acre at a10 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 or more. For producers with access to good markets, the results indicate a good return for a small dollar and labor investment.

The Old McDonald analysis does not include land costs or future real stumpage price increases (above the rate of inflation) or decreases. Real stumpage prices for pine have increased dramatically in the Midsouth, at an annual rate of 2.5 percent for pulpwood and 5 percent for sawtimber from 1988 to 1998.

**Table 1. Old McDonald's Financial Measures
(After Income Taxes).**

	After Tax Discount Rate (%)				
	6	8	10	12	14
Present Net Worth (\$/Acre)	655	352	183	89	35
Annual Equivalent Value (\$/Acre)	43	29	19	11	6
Internal Rate of Return	17%				

This analysis is for marginal land of average productivity. On more productive land with the same assumptions, greater rate of returns would be expected. Alternatively, lower returns would be expected on less productive land.

Evaluating Alternative Tree Crops on Your Farm

Dollar returns and rates of returns are not the sole criteria in deciding whether to invest in a tree crop. Your decision will be based on many factors, such as 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 also 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 does not generate a high dollar return per acre. But they may well give a higher return on your investment capital than more highly valued trees (e.g., black walnut).

Finally, consider risk. Numerous production problems such as weather, disease, and insects can reduce the productivity of 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, a financial analysis is necessary. Your local Extension agent, farm management agent or state forester will be able to help.

Table 2. Information Sources for Tree Crops Selection

FACTOR	INFORMATION SOURCE
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, NRCS office
Harvesting and marketing	Private forestry consultants, Extension agent

Federal and State Cost-Share Programs

If you want to raise a tree crop on your 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 control and timber stand improvement. To find out what is available in your county, contact your county forester, Extension agent or local Natural Resources Conservation Service (NRCS) representative.

Cost-share funds simply 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.



Thinned plantations can provide excellent habitat for wildlife.

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 use plantations. A planting arrangement that increases habitat for wildlife can increase animal populations without 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 1

Assumptions Used for Old McDonald's Financial Analysis

<u>Item</u>	<u>Assumption</u>
Site index	60 feet at age 25
Planting density	500 trees per acre
Seedling and planting cost	\$65 per acre
Herbicide application	\$40 per acre
Release treatment	\$70 per acre
Prescribed burning	\$10 per 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	3% per year
Tax treatment	Reforestation credits for planting, all else ordinary income expenses
Stumpage diameter ranges	Pulpwood: 4-7 inches Chip-n-saw: 8-11 inches Sawtimber: 12 inches or more
Stumpage prices	Pulpwood: \$15 per ton Chip-n-saw: \$20 per ton Sawtimber: \$35 per ton

Growth and financial measures were estimated with WINYIELD, a microcomputer-based timber yield forecasting and planning tool. For further information, contact:

Forest Resources System Institute (FORS)
P. O. Box 1785
Clemson, SC 29633-1785
Phone: (864) 656-7723

Appendix 2

Average Weight to Volume Conversions for Southern Yellow Pine

2.5 tons per cord (range 5,000 to 5,600 lbs)

9.5 tons per 1,000 board feet (MBF)
Doyle Rule (range 19,000 to 22,500 lbs)

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