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Growing Christmas Trees in the Pacific Northwest

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**A Pacific Northwest Extension Publication
Oregon • Idaho • Washington**

PNW 6 / Revised August 1985

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Christmas trees are a deliberately planned, managed, and renewable farm crop. They are a big business in many areas of the Pacific Northwest. Each year about 6 million trees, mostly Douglas-fir, are cut in Idaho, Oregon, and Washington. The sales value of this crop to the growers is an estimated \$70 million dollars. Trees are shipped to markets in many states and in some foreign lands.

Today's trends are:

- an emphasis on production of quality trees and shorter rotations;
- increasing numbers of plantation-grown trees;
- decreasing numbers of uncultured natural trees;
- Douglas-fir remaining the dominant Christmas tree species;
- noble-fir remaining the second most popular species, followed by grand fir;

- declining or stable production of pines;
- increasing numbers of U-cut plantations near population centers.

Judge your opportunities

Whether you are thinking about managing natural Christmas tree land or starting a plantation, you need to consider all the factors involved—motivation, soil and climate, topography, location, accessibility, protection, labor requirements, financing, financial rate of return, record keeping, governmental regulations, competition, taxes, harvesting, and marketing.

Motivation

Popular opinion is that Christmas tree growing is merely planting trees, waiting several years, then returning to reap the profits. Experienced growers, those who have endured the trials and tribulations of learning how to grow high quality trees, know better.

As with any other enterprise, it is important that prospective growers understand the principles and prospects of Christmas tree production and then consider the commitment of time and resources before launching into a major project.

Consider your land

Plantation-grown Christmas trees are usually grown on moderately good ground. Soils easy to work—with good depth, open texture, medium fertility, good drainage, and moderate acidity—will usually grow good Christmas trees. Poor soils and sites—thin, rocky soil; dry, hot, or poorly drained sites—are generally unsuitable for Christmas tree production.

The tree species you grow must be suited to the soil you have. Use the native trees as a guide when deciding what to plant. If they are desirable Christmas tree species and grow well, chances are you have the right combination of soil and climate.

If you intend to plant introduced species, check their performance on neighboring plantations where conditions are similar. The more varieties of Christmas tree species that are suited to your land, the more valuable your land is for raising Christmas trees. Select only species recommended for your location and those species that are in demand.

Try to avoid frost pockets and areas with poor air drainage. Those sites often experience late frosts that damage new growth. Almost all fir species are susceptible to frost damage, but pines are less so. Poor air drainage also tends to aggravate foliar disease problems.

It is risky to invest in large plantings of trees that are not native to an area unless the soil and climate are favorable. If you plan to grow unusual or untested species, make a small trial planting first. Watch the growth and development for a period of time. Be sure that the trees are not especially susceptible to insects and diseases in their new location.

Location

If you are purchasing land, be sure it meets all the requirements. Locating near market outlets will be a big advantage to you, especially if you plan a U-cut operation. It is also helpful if local retailing operations or shipping points for wholesalers are close or accessible by good roads.

Consider the possibility of quarantines. The presence of pine shoot moth, gypsy moth, or other pests may prevent shipment of trees to your desired market.

Accessibility

Good roads are important. They should be all-weather roads, since your most important operations are during bad-weather months. The soil that grows your Christmas trees must also support the network of harvest roads you use to take out your trees.

If you raise your trees on fairly level land, your costs for laying out and maintaining roads will be lower.

Protection

Theft and fire are problems in the Christmas tree business. You can reduce these greatly if you have the right location. For example, if the main road to your woodland passes your house or farm buildings, it is easier to control entrance and exit of people. Areas within rural fire districts have additional protection.

Labor requirements

Labor costs are a big expense. Besides wages, you must pay Social Security, payroll taxes, and insurance.

All Christmas tree lands need work to increase the quantity and quality of trees. Unless you can do the job alone, you had better arrange for the necessary help beforehand. You will need labor in the rush season to help you cut and transport trees, solicit orders, and manage sales. Help is also necessary during planting, shearing, and other cultural tasks.

Briefly, these are some of the problems you will need to consider if you desire to become a Christmas tree producer. Now let's take a closer look at the business of growing Christmas trees.

Managing plantations

Christmas tree plantations are usually established on tillable ground formerly used for agricultural purposes. Although many fine Christmas trees are produced from plantations, these fields don't grow good trees automatically. For many plantations, a high level of intensive management is required to produce a quality product. Many plantations develop troubles because of low fertility, poor water or air drainage, rocky soils, or inadequate soil preparation.

Ideal plantation land is fertile enough to provide a vigorous growth rate. In these situations, growth rate may be much greater than you need for normal development of Christmas trees. Prune and shear this excess growth to attain the desired tree quality.

Throughout the crop rotation, grow trees in a relatively uncompetitive environment by controlling weeds (but preventing soil erosion), insects, diseases, animals, and other destructive pests. Not only are tree survival and vigor important, but you must maintain the ornamental value of the trees as well.

If you already own the land, you must determine the suitability of each field for the species you intend to grow. If a careful analysis shows that the land is unsuitable, either drop the project or purchase land that is suited for growing Christmas trees. When you think you have located suitable acreage, check it out with the help of your county Extension agent, or a consultant and successful growers, before purchasing.

How large an operation should you plan? This depends on the time and capital available. The question "What is a full-time operation for one person?" often arises. The answer is that one person should be able to manage 80 acres of Christmas trees, except for short peak periods in shearing and harvesting.

It may be difficult, economically, to justify farming a small acreage when you consider amortization of labor-saving equipment and the need to assure buyers of an adequate volume of trees over a period of time.

Choosing your species

Consumer demand, geographic location, soil, and climate determine which species you can grow most profitably. Plantations have been established for at least 20 years in most Christmas tree areas. Growers have had the opportunity to plant improved species or strains and evaluate results. When you start a plantation, therefore, first check out existing plantings and discuss selection of species with your Extension agent.

Except in isolated areas, very little success has been encountered in quantity planting of the following species:

Austrian pine	giant sequoia
Bishop pine	western white pine
Norway spruce	lodgepole pine
blue spruce	concolor fir

The principal Christmas tree species that are recommended for planting in the Pacific Northwest are: noble and Shasta red firs, grand fir, Douglas-fir, and Scots pine and shore pine (figure 1).

The true firs (*Abies*), because of their characteristic uniform branching and formal appearance, usually command the best price on the market. However, they develop slowly and require intensive management.

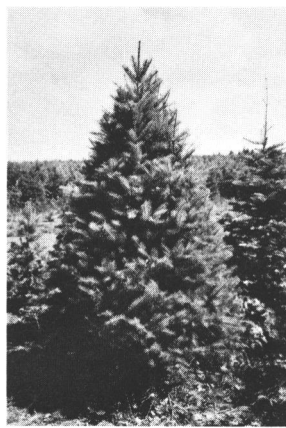
Many true firs are high-altitude trees and have been established successfully in only a few plantations at lower elevations. Shasta red fir (*Abies magnifica* var. *shastensis*) and noble fir (*Abies procera*) are two examples. They are not recommended in areas east of the Cascade Mountains.

West of the Cascades, noble fir does well in only a few places, usually at higher elevations. Rotation period for these species varies from 8 to 14 years, and growers can expect significant losses during that period.

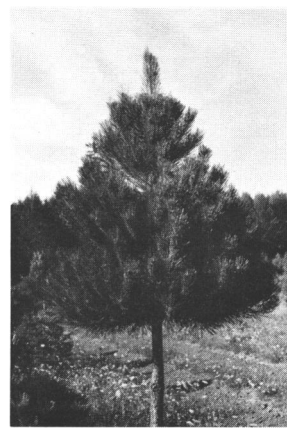
Grand fir (*Abies grandis*) grows naturally in widely distributed areas of the Pacific Northwest. It is well liked and widely used in many areas. Of all the true firs, it is usually the most easily grown in plantations. In



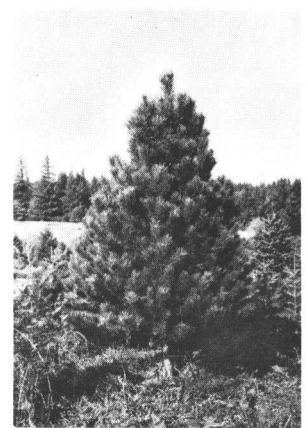
Noble fir



Douglas-fir



Austrian pine



Shore pine

Figure 1.—Four popular Christmas tree species.

recent grand fir provenance tests (relocating trees from area of origin), seed sources from Grangeville, Pend Oreille, and McCall, Idaho, and from Pomeroy, Washington, proved to be the best. This tree is well suited for U-cut operations.

Douglas-fir (*Pseudotsuga menziesii*) is a Pacific Northwest species that is well suited for both timber and Christmas trees. It grows naturally on a wide variety of soils under great climatic variations. However, plantings in northern Idaho have had a great deal of trouble from frost damage, Douglas-fir needle blight, and the Douglas-fir needle midge.

Oregon has also experienced these problems. Oregon growers can avoid them by planting the Vancouver Island (Duncan), Shelton (Cushman), or medium-elevation coastal strains (valley slopes). These strains exhibit late budburst, which avoids the frost season and the main midge attacks.

Scots pine (*Pinus sylvestris*) is a native of Europe that is widely used for Christmas trees in the United States. Scots pine probably is the only choice for wet areas. *Lophodermium* is a serious foliar disease west of the Cascades that is difficult to control. However, *Lophodermium* is not a problem in Idaho, and Scots pine is a popular choice there.

The varieties to use are the Spanish Guadarrama mountain strain and the Spanish Burga. These Spanish strains have short, blue-green needles that do not turn yellow in winter and have good natural form. They respond well to shearing and will grow well on a variety of sites. Another strain that has usually performed satisfactorily is the French Auvergne.

The Cascade variety of lodgepole pine (*Pinus contorta*) is not recommended because of its light-branching habit and erratic response to shaping. Shore pine, a coastal variety of lodgepole, plays a limited role in west side plantations. Its only recommended seed sources are within 1 mile of the Pacific Coast from Port Orford, Oregon, south to Crescent City, California. This tree has luxurious, short, dark green needles. Like Scots pine, it responds well to shearing.

Austrian pine (*Pinus nigra*), like Scots pine, is a native of Europe and has many geographic strains. It has stiff needles and rigid branches suitable for

flocking. Only a limited number of this species have been planted because of poor color and shearing response.

Norway spruce (*Picea abies*) is another native of Europe that has been planted on a variety of sites in the Pacific Northwest. It has a moderate growth rate and responds well to shearing. The foliage is an attractive blue-green, composed of short, stiff, prickly needles. Major drawbacks are poor needle retention and susceptibility to spider mite and spruce bud scale. Norway spruce does not store well, but it's good for U-cut plantations.

Western white pine (*Pinus monticola*) is a native of parts of the Pacific Northwest. The tree has medium-length, soft, blue-green needles. It has a moderate growth rate and responds well to shearing. Disadvantages are its light branch structure and extreme susceptibility to the European white pine blister rust. Western white pine should only be grown on moist, well-drained sites.

Obtaining planting stock

The main sources of Christmas tree planting stock vary from state to state. For specific information about seedlings available from public and commercial nurseries, consult your Extension agent, a neighboring grower, or a growers' association. Always buy planting stock of good quality from proven seed sources.

Preparing the land

Seedlings do poorly—or may not survive at all—if you plant them in grass and weeds or in infertile or poorly-drained soils. For successful plantings, treat seedlings as you would treat household shrubs.

Soil preparation is important, before planting and for soil management afterwards. Plow deeply, disk, and harrow (figure 2). Subsoiling may be needed where previous shallow plowing was the rule. Planting 8- to 10-inch root systems is quite different from sowing wheat or barley, so take care to establish the roots properly.

Drylands of eastern Washington, Oregon, and Idaho, and areas covered with heavy sod should be

plowed in the fall or spring and summer fallowed. Where neither moisture or sod are problems, plow in the fall or early winter. Disk or harrow immediately before planting in the spring. After planting, control weeds with herbicides.

Planting can be done on stump lands where cultivation is not possible. Prepare the site by piling and burning debris and scalping sod from 3-foot-diameter spots where trees will be planted. Follow up with a herbicide to keep scalped spots weed-free.

Laying out the roads

A well-laid-out road system will reduce harvest costs and speed up every plantation operation from planting to harvest. You can provide roads by skipping the planting of two adjacent rows every 400 feet. The road system will serve as a firebreak as for access.

Plantation roads are a permanent investment; you can charge the costs against several crops. You can reduce costs (and greatly increase profits) by carefully planning the road layout when you prepare the land for planting. It is far more efficient to lay out roads before planting than afterwards.

Planting the trees

West of the Cascades, February 1 to May 1 is the most common planting time, but planting in early fall is an alternative. East of the Cascades, early spring planting is recommended.

In spring planting, the less time you allow between planting the trees and their breaking dormancy, the more chance they have for survival. Planting in early fall has been successful for some growers. This practice depends on excellent ground preparation and careful seedling handling. Significant root growth occurs during early fall planting.

Trees planted in late fall, however, have little root growth and must endure all the winter hardships before the growing season begins. Frost heaving can be a real danger for late-fall-planted trees, except where deep snows cover the ground all winter.



Figure 2.—Final field work with a roller-cultivator-harrow before planting.



Figure 3.—A crawler-drawn, two-row planting machine can get the job done fast and efficiently.

In mild climates at low elevations, you can plant during the entire dormant period if there is enough soil moisture. At higher elevations, where deep snow stays on the ground until early summer, fall planting is a must.

Cool, humid weather is ideal for planting. In such weather, the trees are unlikely to dry out during and after planting. Also, the ground is easy to work and in good condition for planting operations. Weather permitting, the month of March is ideal for planting trees in western Oregon and Washington; April, on the east side.

Growers who plant or replace trees by hand usually can get started earlier than those who machine-plant. Although a field may have been worked the previous year, final shallow disking and harrowing is necessary just before planting by machine. When planting by machine, the soil must be friable and flow easily into the planting slit (figure 3).

Planting tools and machines

There are two kinds available—hand tools and planting machines. The kind of tool to use is determined by the condition of the planting site, tools available, size of the job, size of trees to be planted, and the costs. PNW 33, *Plant Your Trees Right*, describes proper tree planting (see “For further reading,” page 15).

How to plant

Planting young trees is a simple operation, but it must be done carefully to be successful. Here are the important points to remember:

1. Plant during cool, humid weather, if possible.
2. Keep the roots covered and moist at all times. When you plant by hand, carry the trees in a canvas bag or bucket with the roots covered by wet moss or shavings.

3. Set the tree upright in a hole or slit large enough to hold the roots without crumpling or bending them. Spread the roots out in as natural a position as possible.
4. Plant neither too deep nor too shallow. The planted trees should have all their roots well covered. Set the tree at the same depth or about ½ inch deeper than it was growing in the nursery. A color change on the stem above the root system marks the former soil line. This is the root collar, and you can use it as a marker for setting the tree to the right depth. When you set the root collar no more than ½ inch under the surface, it will be at the ground line when the fill soil settles around the roots.
5. Use loose, moist, crumbly soil to cover the roots. Spread the roots in as natural a position as possible. Tamp the soil well around the newly planted tree for close contact between soil and roots and to eliminate air pockets.
6. Check to see if the tree will resist a slight pull. It should feel solidly fastened in the ground. A correctly planted tree will never pull out of the ground easily.
7. Water the newly planted trees if there are droughty conditions or soil seems dry. If your rainfall is less than 24 inches a year, seasonal irrigation is desirable to help establish the trees and carry them through the first one or two dry summers. Get the advice of your Extension agent before you plant a Christmas tree crop in such areas.

When you plant trees where rainfall is less than 24 inches a year, settle the roots with water at planting time and irrigate during the summer months. Furrow irrigation is preferred to sprinkling. A periodic good soaking is much better than frequent light watering. The object of irrigation is to provide enough water to keep the tree healthy and yet force it to extend its roots down to any available underground moisture.

Use a spacing of 4 × 4 feet or less only when you have a market for small trees (see table 1). If most of your trees will go as 6-footers, a spacing of 5.5 × 5.5 feet will be adequate.

After planting, inspect the trees periodically for indications of damage. Plan on a 10% loss of each species when ordering the trees, and increase orders by this amount to provide for normal replacement needs. You could transplant the extra trees, which will grow and gain in size in a garden row until you need them as replacements.

Culturing plantation trees

During the first 2 years after planting, concentrate on replacing losses, cutting out multiple leaders, and keeping the area free of any grass or weeds that develop. For the majority of plantations, cultural activity starts in earnest after the third growing season.

At this point, cut back excessively long leaders and shear sides to 40 to 60% taper. You can also do basal pruning at this time to form a handle, providing you don't remove more than one-third of the foliage.

Table 1.—Number of trees per acre at various spacings

Spacing	Planted solid	After 10% reduction for roads
4.5 × 4.5 feet	2,151	1,936
5 × 5 feet	1,742	1,568
5 × 6 feet	1,452	1,307
5.5 × 5.5 feet	1,440	1,296
5.5 × 6 feet	1,320	1,188
6 × 6 feet	1,210	1,089
6.5 × 6.5 feet	1,031	928

Practice basal pruning

Basal pruning is the removal of unwanted branches below a selected good bottom whorl. This type of pruning will:

- reduce rate of growth when you remove more than one-third of the live crown (removing more than 60% of the crown usually causes serious slowdown of growth, and perhaps yellowing of the foliage for a year or longer);
- determine the usable portion of the crown;
- strengthen branch structure and increase needle density; and
- create a smooth, clean, knot-free handle (the short stem section between the butt end and the bottom branch whorl).

When basal pruning, select a bottom whorl with four or more strong, evenly spaced branches, about 12 to 24 inches from the ground. Remove all unwanted branches below the whorl with a hand pruner or short-handled pruning saw.

Delay basal pruning until not more than one-third of the total foliage on the tree will be cut off. This will prevent excessive shock, which causes delayed development of the trees.

Shearing

Shearing, the practice of cutting the leader and lateral branches to improve shape and density, will:

- increase density by encouraging growth of branches;
- control excessive growth of Christmas trees located on fast-growth sites; and
- produce more salable trees per acre by salvaging trees that would not otherwise be salable.

Shearing is done with either a shearing knife or a power trimmer. Shearing crews also often carry hand pruners for hard-to-get-to places. A few seconds' work with hand pruners on difficult terminal whorls will assure an improved tree. Another tool that's being used increasingly is a power-operated, lightweight sickle bar.

Douglas-fir shearing can be done any time after budset in midsummer and before budburst in April. Shear a tree when the usable height attains about 5 feet (figure 4a). Trim the leader back to good proportion, just above an internodal bud.

At the same time, shear the side branches back to form a 40 to 60% cone. A tree is a 60% cone when the



Figure 4a.—Seven-year-old Douglas-fir, before and after shearing.



Figure 4b.—Six-year-old Scots pine, before and after shearing.

width is 60% of the height. Repeat this process each year until the tree is ready for harvest.

True firs (*Abies*). Grand fir, and to a lesser extent concolor fir, can be sheared like Douglas-fir or left unsheared. However, noble fir and Shasta red fir make better-quality trees if they can be grown without heavy shearing.

Whenever possible, control leader growth of the noble fir and Shasta red fir by shock treatments such as basal pruning, leader scarring, or pruning. If it's necessary to shear to correct lopsided shape or excessive width, the fork-shearing method is recommended.

This consists of cutting the tips of main lateral branches just above a pair of secondary buds or branchlets for desired shape and taper. You can reduce the crook or "dog-leg" resulting from cutting the leader by shearing during the succulent stage.

Pines. Unlike firs, pines should be sheared only when succulent. Shearing should begin when needles on the new shoots are about half as long as the last year's needles (figure 4b). Thereafter, shearing may be continued for about 30 days for Scots pine—but only about 10 days for shore pine, western white pine, and Austrian pine, which do not form buds as readily as the Scots pine.

About 60 days after succulent shearing, the cut leader and branch tips will form new buds for next year's growth. This budding characteristic makes pine the easiest of all trees to shape—if you shear at the right time. Sheared pines should be shaped to 40 to 60% cone.

Grow your seedlings in a relatively noncompetitive environment through the use of herbicides or cultivation, but at the same time take any steps necessary to control soil erosion. Protection from insects, diseases, animals, and other destructive agents is also essential for good survival and growth.

Managing natural stands

In managing a natural Christmas tree area, you have to start as you find it. Your first decision is whether the best land use is for raising timber or Christmas trees.

Check the trees growing on the land. If the species is suitable and not beyond Christmas tree size, if average distance between branch whorls is less than 14 inches, and if most of the trees are dense, uniform, and a dark-green color, then your site is probably suitable to grow unsheared trees.

If the distance between branch whorls is more than 14 inches, the trees probably will benefit from annual shearing.

If you decide that an area is suitable for Christmas trees, you are ready to plan your operations.

Plan the roads

You need an adequate network of harvest roads throughout your Christmas tree area. Lay these out with

an eye toward permanence, and be sure that they are passable the year around. Often you can plan the roads so they will also serve as firebreaks. Fit existing woods roads into your permanent road plan as much as possible. Build new roads as needed to open the area for harvest and protection.

Lay out the roads on the contour to avoid steep grades. In the long run, a well-laid-out road system will more than pay for itself in reduced road upkeep costs, harvesting efficiency, and savings on transportation equipment repair.

Use cultural practices

One experienced tree farmer says, "Farming Christmas trees consists generally of removing vegetative competition and building quality into the trees by systematic thinning, pruning, and shearing."

Every job that you do to improve the number and quality of Christmas trees is a cultural practice. You will practice many of them if you stay in the business very long, whether you manage natural tree lands or establish a plantation.

Natural tree lands vary in competition more than plantations, and they vary in their needs for cultural practices. Natural tree lands usually contain trees of different ages, including seedlings, saplings, and poles. The trees grow singly or in dense patches. Some spots may be barren of trees.

Tools commonly used in cultural practices are the light chain saw, double-bitted ax, machete, hand pruners, hedge shears, and shearing knife.

Reduce competing growth

Bushy, well-formed, well-colored trees can develop only where there is enough room to grow in all directions. Trees grown in hardwood brush usually have lower branches that need to be pruned off to a point above the brush to make good trees.

Controlling the brush allows the trees to develop uniformly and close to the ground. It also permits natural reseeding and encourages faster growth because the trees do not need to grow through and out of the brush. Hardwood brush is more persistent on fast-growth sites.

Remove all undesirable hardwood and coniferous growth in the Christmas tree area. Strip the branches from cut trees so they will lie close to the ground and rot quickly. Dead trees with limbs make it difficult to move around the area and also deform small Christmas trees that may be growing nearby.

Grass is also competitive, and you'll have to control it—especially in low-rainfall areas. Grass is easy to control with direct application of herbicides.

Thin excess trees

Christmas trees spaced too closely interfere with each other's growth. For instance, when two trees grow too closely together and their branches overlap, those branches do not grow as fast as branches on the open side, and neither tree grows symmetrically.

Beginners almost always keep too many trees. At Christmas tree size, not more than 2,000 well-spaced trees per acre can grow unhampered. Cut out the excess

trees so the remaining trees will have ample room to grow in all directions. An average spacing of about 5 feet between trees of near marketable size is adequate. Uniform spatial distribution is important.

Your first step in a densely stocked natural stand is to harvest in the first cutting as many salable trees as possible. If the remaining trees are still crowded, cut enough other trees to provide ample space for growth.

Try to visualize the room needed for each tree to develop to Christmas tree size without interference from adjoining trees. Small, unwanted trees may be used for wreath or garland material.

Some growers leave several tall trees as a seed source for future crops. For each acre, keep at least two well-spaced seed trees with genetically acceptable traits when you rely on natural seeding to reproduce a crop.

Except for the seed trees, most growers limit tree size to 10 feet. The size depends on the market, but the most popular tree sizes are from 5 to 8 feet.

Protection

Protecting trees can be a troublesome and costly part of any Christmas tree venture. Theft of mature trees is a common risk. Fire, insects, diseases, and animal damage are other problems.

Fire

Fire protection is a seasonal concern of the Christmas tree producer. Some Christmas tree acreages can become susceptible to burning any month of the year. Light fuels, such as dead ferns or grasses, will dry out between rainy spells and become a fire hazard. Caution signs have value, but more positive steps are recommended.

If your Christmas tree areas are near principal highways, housing developments, railroads, or other situations that increase fire risk, they definitely need fire lanes for protection. Adequate fire lanes bordering plantations, plus interior ones if needed, are a good investment. Locate fire lanes so that fires can be reached and controlled with a minimum of lost time. Primary road systems can be planned to serve as fire lanes.

Fire lanes can vary from 6 to 15 feet or more in width. Keep them clean by plowing, disking, or by using herbicides. Interior lanes will vary in number and width according to location. Omitting two rows of trees about every 400 feet provides fire lanes as well as access roads.

Some fire tools and other equipment should be available at a Christmas tree plantation at all times. Some growers also construct ponds or water holes so that a dependable supply of water is available in case of a fire.

“No smoking,” except in designated areas, should be enforced during periods of high fire danger.

Posting Christmas tree areas and closing access to them will discourage trespass and may prevent some fires.

Trespass

Trespass is unlawful entry or theft of trees. It is a problem that you can best solve by cooperating with law enforcement officers and local residents. The problem is less troublesome when the trees are growing on your home property where you can watch them.

You can control theft somewhat by using barbed wire fences, locked gates, and signs. In problem areas, special fencing or a hired guard may be the answer.

Animals

Livestock and Christmas trees don't mix. Protection from grazing animals is as important as protection from fire. Keep cows, sheep, horses, and goats out of your production area at all times. If this is impossible, it's better to defer Christmas tree farming.

Livestock cause damage by browsing, rubbing, and trampling trees and make it impossible to grow a salable crop. A good fence around the Christmas tree area is the best defense against livestock.

Deer are especially troublesome when plantations are located next to extensive forested areas. During the early growing season, deer (and sometimes elk) will supplement their diet with tender, succulent fir tips. Deer also scrape off bark and break branches by rubbing trees with their antlers. If deer have become a threat to your Christmas tree operation, ask your state wildlife agency for assistance.

Several effective repellants are available, but you need to apply them repeatedly to prevent browsing. Controlling grass in the Christmas tree area is perhaps the most effective way to prevent animal damage.

Other serious mammalian pests are mice, rabbits, mountain beaver, moles, gophers, and squirrels. Meadow mice and rabbits are particularly troublesome. Injury occurs mainly during the winter months and consists of girdling or cutting the stem at or above the ground line.

East of the Cascades, gophers are a serious problem. Growers must often treat adjacent properties as well as their plantations. Contact your Extension agent for appropriate gopher control methods.

Soil deficiencies

A soil analysis is recommended to pinpoint deficiencies. The land grant university in each state will perform a soil analysis for a fee, and there are commercial laboratories that offer a similar service. Lack of nitrogen is the most common deficiency, especially on the glacial till soils of western Washington.

Most farmland suitable for Christmas tree plantations has ample mineral nutrients. Apparent deficiency symptoms are generally a secondary response to some other problem.

Nitrogen fertilizers such as urea, ammonium nitrate, and ammonium sulfate often produce spectacular improvements in natural stands. Most species produce lush, dark-green needles during the first growing season after nitrogen is applied in April or May.

Besides providing a dark-green color, nitrogen also stimulates tree growth. You'll need to control growth by shearing. Needle color of pine is controlled primarily by

genetics, so there will be little or no response to nitrogen.

On large areas, chemicals are sometimes broadcast by airplanes, helicopters, or tractor-drawn spreaders. Small areas can be treated by hand or by using light, portable spreaders—such as hand seeders and backpack pumps.

Insects and diseases

On most Christmas tree operations, a light and spotty occurrence of insect and disease damage is common. There is no great cause for alarm as long as the incidence remains low. Environmental conditions that favor the development of certain pests can arise, however, resulting in economic losses.

Prompt control is necessary if trees show undue loss of vigor, webs, spittle, deformed or dying shoots, unusual buildup of insects, visible fungal fruiting bodies, or discoloration and dropping of needles. Before you take control measures, talk to your Extension agent or your consultant. They can help you identify problems and recommend control measures.

No species or variety of evergreen is immune to insect attacks. Insect damage is likely to show up as one of three types—discoloration, defoliation, or general loss of vigor. Generally, insecticides are most effective and least costly when you use them according to label directions at the earliest sign of an infestation.

Recognizing and controlling diseases can also be vitally important in Christmas tree production. Learn to recognize common diseases and know their control. Sanitation is the major control for most Christmas tree diseases. Swiss needle cast of Douglas fir, however, is easily prevented chemically. Rust diseases may be controlled by removing alternate hosts.

Some individual trees seem to be more susceptible to certain diseases than others. Remove such trees and burn them. Consult your Extension agent, attend educational meetings, and learn how to use the Pacific Northwest pest control handbooks (see “For further reading,” page 15).

Certain species of trees must be certified free of specified insects and diseases before they will be allowed into areas that do not now have these harmful organisms. Certification of disease- or insect-free status is done through a trapping and inspection program provided by your state Department of Agriculture. Fumigation may also be required. Services of the program are only offered to growers requesting assistance, and fees are charged for the various services.

Weeds

Weeds are detrimental to Christmas trees. They compete for moisture, nutrients, and light, and they provide a habitat for mice, gophers, and other pests. Therefore, weed control is important in establishing and maintaining a stand of Christmas trees.

Balancing the need for weed control is the need to prevent soil erosion. You’ll need to establish a program that eliminates competition during the growing season and provides adequate cover to hold the soil in the winter.

Depending on the type of operation, different weed species cause the most serious problems. In plantations,

Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
 - **Read** the pesticide label—even if you’ve used the pesticide before. **Follow closely** the instructions on the label (and any other directions you have).
 - **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.
-

grassy and broadleaf weeds are prevalent. In natural stands, brush, undesirable trees, and bracken fern usually prevail.

There are a number of chemicals available to control weeds. Most of them, however, will damage Christmas trees as well as the plants they are meant to control, if used improperly.

It’s best to consult your Extension agent for specific recommendations on the use of chemicals to insure effective control and safety. Also consult the current edition of the *Pacific Northwest Weed Control Handbook* and *Weed Control in Christmas Trees* (PNW 219) for additional information (see “For further reading,” page 15).

Applying chemicals

New chemicals and improved methods of application are under constant test. Be alert to the growing opportunities for reducing costs of operation and improving tree quality by the proper and timely use of chemicals. Also, be sure to use chemicals in the correct manner and at the right time for greatest effectiveness.

Spray applications can be made by using either aircraft or ground equipment. Aerial application is an alternative method if tree height doesn’t permit use of boom-type ground sprayers.

Boom sprayers mounted on tractors, four-wheel-drive vehicles, etc., give good coverage, but they’re limited to bare ground or small trees that will not be damaged by the equipment.

Hand sprayers include mist blowers, compressed air sprayers, backpack pump sprayers, and sprinkling cans. They’re used mostly for very small areas or for individual trees.

Consult the publications mentioned in the last section for information. Read the product label before you use any chemical spray.

Harvesting and marketing

The marketing effort that you make will help determine your degree of financial success. Market preferences may change over periods of time, and you’ll

have to fit your harvesting practices to the market situation.

About 80% of the trees marketed today range from 5½ to 7½ feet in height. Most larger trees are cut from natural stands or from older plantations where previous harvesting has resulted in wide spacing. Most smaller trees marketed are cut as thinnings.

Individual trees in the stand will vary in size, color, and shape. Judge every tree for quality and readiness for market. Hold a tree for another year or two if its quality and value can be substantially increased. Cutting will be speeded by pretagging those trees ready to harvest.

Choose quality trees with fresh, clean foliage and dense, uniform, well-shaped crowns. In the Pacific Northwest, Christmas trees with a cone shape are considered most desirable. A guiding principle for the taper of the tree is that the crown at the base should be from one-half to three-fourths as wide as the height of the tree—about a 50 to 75% taper.

Harvesting procedures depend on the method of sale. Offering standing trees is called “stumpage sales.” In this case, the buyer does the harvesting. Letting a buyer select the trees introduces the risk of “high-grading,” where the buyer may choose to take only the best quality trees.

You can control this detrimental practice by doing your own marking or by specifying a minimum number of trees that must be taken from each field or cutting block. Most growers, however, prefer to retain control of their stand by doing their own cutting.

Though some growers retail their trees at a lot or sell them “U-cut” at the tree farm, the majority sell to wholesalers or retailers with well-established outlets, thus avoiding the worries and risks of retail marketing.

When you sell trees to a retailer or a wholesaler, the purchaser sets the shipping or delivery date. Cutting

should be done as near the delivery or shipping date as possible so that trees reach the market in a fresh condition.

Harvesting the trees

The most common harvesting tool used in commercial operations is a lightweight chain saw.

If you don't pretag the trees to be cut, the cutters must be able to select marketable trees. The cost of cutting and handling unsalable trees reduces the net profit on all trees. If unsalable trees are left uncut, you might make some into marketable trees for next season through cultural practices.

Each tree cut should have a short section of clean stem, called a *handle*, between the butt end and the bottom branch whorl. A good rule is to leave 1 to 1½ inches for each foot of tree height, depending on the wishes of the buyer.

Trees from natural stands are sometimes cut a few inches longer to allow for final trimming at the wholesaler's concentration yards. Those cut in plantations are usually cut to the exact desired handle length.

After cutting, carry your trees to the roadways and bunch them for loading and delivery. Some buyers are willing to do their own loading and delivering. Others require the grower to do the loading, and perhaps the delivery to the place of business. In any event, the party responsible for doing each of these tasks should be spelled out clearly in your sale agreement (see the sample agreement in table 2).

Some growers may need to have their trees trucked to a concentration yard (see figure 5). Here, the trees are sorted, graded, tagged, baled, and butt-trimmed in preparation for shipment to customers (figure 6). Growers near a good local market can make several cuttings and deliveries to a retail lot, thus insuring fresh trees to the customers.



Figure 5.—The Douglas-fir Christmas trees at the left are headed for market. They have been cut and dragged out to a



woods road for pickup. Trees are sorted, graded, and bundled for shipment at concentration yards (right).

Table 2.—Sample Christmas tree sales contract between grower and purchaser

Christmas treeseller, _____
(Name)

(Address)

hereby agrees to the following conditions:

1. Supply Christmas trees, as described below, to the purchaser:

Species	Height	Grade ^a	Type of shearing ^b	No. of trees (lin ft)	Price per tree (lin ft)	Total price

^a Grade examples include "Field-run as tagged" and "U.S. #2 & Better."

^b Types of shearing examples include "Plantation Sheared," "Light Sheared," and "Unsheared."

2. To *(sell on the stump)* *(stockpile on accessible roadway)* *(load on truck)* *(load on rail car)* *(deliver trees to* _____
_____)
at date and place notified by purchaser.

3. In the event that contracted trees cannot be cut or delivered within _____ days of the date and time notified by the purchaser (because of weather, fire, theft, or other conditions beyond the seller's control), the seller shall return the purchaser's advance deposit within 10 days of notification date.

Christmas tree purchaser, _____
(Name)

(Address)

hereby agrees to the following conditions:

1. Pay the seller an advance deposit of \$ _____ not later than _____, this amount to be applied on the total purchase price of the trees.
(Date)
2. Pay the seller the balance payment due, based on actual tree tally, with certified check, money order, or cash not later than (_____) (before any of the trees leave the point of delivery).
(Date)
3. Notify the seller _____ days prior to the desired (harvesting) (stockpiling) (loading) (delivery) dates, which in any event will not be later than _____.
(Date)
4. Forfeit \$ _____ of the advance deposit in event of failure to comply with paragraphs 2 and 3, above.

Purchaser's signature _____

Seller's signature _____

Date _____
Month _____ Day _____ Year _____

Date _____
Month _____ Day _____ Year _____



Figure 6.—Grading and baling of natural Douglas-fir in Mason County, Washington.

Don't string-bale your harvested trees until just before shipment. This prevents compressing and heating as a result of long storage in the bales. Assemble cut trees and store them under cool, moist shade; protect them from wind and direct sun to retard moisture loss. Storage piles should be shallow to prevent compressed crowns and overheating, and to allow the absorption of rain.

Selling Christmas trees

There are four possible ways to sell trees. You can sell to a wholesaler, sell to a retailer, sell at your own retail lot, or retail the trees on the stump on a "U-cut" basis.

When you sell trees to a wholesaler, you can sell trees at any of the following points:

- standing in the field or forest (stumpage sales),
- piled by the roadside or loaded on trucks at the Christmas tree farm,
- delivered to a railhead,
- loaded on railcars, or
- delivered to a concentration or processing yard.

When you sell trees to a retailer, you can sell trees at any of the following points:

- standing in the field or forest (stumpage sales),
- piled by the roadside,
- loaded on trucks at the roadside, or
- delivered to a retailer's storage area or a retail lot.

Marketing level	Percent
Producer	30 to 50
Wholesaler	10 to 20
Retailer	40 to 50

Keeping up on tree values is a must in effective selling. Prices vary widely depending on location, demand, species, and quality. The price of cut trees

stockpiled or loaded on trucks at the farm usually varies from 30 to 50% of the consumer price. If the buyer buys stumpage and does the harvesting, the price is usually 25¢ or 50¢ less per tree.

Avoid consignment sales. Consignment is a poor selling method because the grower is paid only if the buyer is able to sell the trees. It's a risky procedure, because you as the grower have no guarantee that the buyer will sell the trees or report truthfully the number of trees actually sold.

Selling to a wholesaler. Growers of large numbers of trees will probably find wholesaling the best method of sale. You will want to do business only with established, financially responsible firms. Christmas tree selling is a short-term, fast-moving operation that calls for cash payments or contracts that are as good as cash.

A sales contract is strongly recommended. This protects both parties by spelling out what each agrees to in the transaction, and it avoids later misunderstanding (see table 2).

Ask the advice of a lawyer, if necessary, and be sure the contract covers every important consideration for both parties. The contract must be in proper legal form, so check it with a qualified attorney when you have decided what to include.

A common requirement of Christmas tree sales contracts calls for a 50% payment at the time of contract—and the remainder by cash, money order, or certified check—before the trees are loaded for shipment.

Trees for sale need to be advertised early so that prospective buyers will be informed and have the opportunity to inspect your crop. In soliciting prices, indicate the quantity, quality, and species of trees for sale. Include information on when and where the trees can be seen. Designate which trees are for sale by tying brightly colored brightly colored strips of plastic to the leaders. This enables the buyer to judge the offered trees. It makes tree cutting easier.

It's vitally important to get your trees to the market at the right time. The cutting and delivery arrangements should be agreed on when the contract is signed. Contract arrangements with the buyers should be completed by October 1.

You should have some knowledge of consumer demands at various retail outlets. You can tailor production to demands and at the same time increase buyer interest in the crop.

Selling to a retailer. Procedures are similar to that of selling to a wholesaler, but usually smaller quantities of trees are involved. Somewhat higher prices often are charged to retailers than to wholesalers, to protect the wholesaler's profit margin and to compensate for your higher costs of handling small quantities of trees.

The most common practice is selling stockpiled or truck-loaded trees at the farm. However, some retailers prefer to cut their own trees or have them delivered directly to their retail lots or stockpiled in town.

Selling at your own retail lot. Small growers who can retail their own trees may gain by doing so, since retail prices of Christmas trees are frequently double those of wholesale prices. However, consider the possible

problems of direct competition with other retail lot operators or large chain stores and other stores that use Christmas trees only as “lead items” for the Christmas rush.

Successful retailing of Christmas trees depends on a number of things. A few of the keys to success are:

- nearness to larger population centers;
- good advertising in local newspapers and on radio and television;
- good lot location;
- adequate parking space for customers;
- enticing displays; and
- prompt, courteous attention to customers.

Growers who retail their own trees can:

- learn firsthand which Christmas trees the public wants and how well their trees measure up to demands;
- keep a fresh supply of trees on hand by cutting frequently;
- arrange and display trees to best advantage;
- capitalize on specialties of the season—wreaths, cones, greens, and special orders for flocking.

Along with the advantages of retailing, you’ll encounter some business problems. Establishing a retail yard involves costs for licenses, lot rental, light, water, business fixtures, security, and advertising. You must sell enough trees to pay for these costs.

Good advertising, merchandising, and sales techniques will help. The public will pay more for the best, so grade the trees and price them according to quality. Show customers the different grades.

Display trees effectively and separate by species, size, and quality. Use good labels that advertise your quality trees at competitive prices. Try to have ample space for displaying trees and parking cars.

A good location for the Christmas tree lot is important. It is sometimes hard to find and it may be costly for such a short time as the 3-week period when most trees are sold.

When you sell Christmas trees retail, remember to:

- concentrate on high-quality trees—buyers will take them, like them, and pay more for them;
- preprice the trees and display them in individual stands;
- sell on a cash basis;
- hold trees for customers only when they make a substantial deposit;
- increase sales by advertising; and
- cut and deliver at frequent intervals to insure freshness and to avoid large unsold inventories.

Selling U-cuts. Many people like to choose and cut their own trees at the Christmas tree farm, rather than buy them from a lot in town. Retailing by the “U-cut” method at the Christmas tree farm will eliminate rental and other costs of the city lot, but it will involve some other considerations.

U-cut farms must have a variety of species available. They must be reasonably accessible, and adequate roads

or trails must be built throughout the cutting areas. There must be restrooms and space for parking cars. It’s necessary to furnish the handsaws and maintain the premises in a safe condition for the public. Adequate public liability insurance is an essential precaution in such an operation.

Retail specialties. Along with the Christmas trees, you might consider making specialty items connected with the Christmas season and displaying and selling them at the lot. These may offer additional profit opportunities.

The most popular item is fragrant bunches of cedar, pine, and noble fir boughs. Wreaths, door swags, tree cones, holly boughs, and mistletoe are additional possibilities. Some retailers keep a supply of Christmas tree stands on hand for sale.

Water stands are a particularly good item because they keep a tree fresh and natural-appearing during its display season. Fresh, moist needles are flame-resistant, as well as attractive.

Some people like their trees flocked with artificial snow. Flocking usually doubles the price of a green tree. You must store and display flocked trees where they’re protected from wind and rain.

Some people are concerned about the fire hazard of a Christmas tree. Assure them that a fresh tree is the most fireproof tree. Mounting the tree in a water stand and keeping it away from heat outlets will help maintain freshness for several weeks.

Christmas tree grades

United States standards for grades of Christmas trees were established in 1957 and revised in 1973 by the Agricultural Marketing Service, USDA. These are voluntary standards, but they establish a sound and practical basis for determining quality and price. The grades can be applied to either sheared or unsheared trees of any coniferous species normally marketed as Christmas trees.

Three grades are recognized: U.S. Premium, U.S. No. 1, and U.S. No. 2. Grades are based on density, taper, balance, foliage, and deformities of the tree. Table 3 shows the requirements for each grade.

Laws and regulations

Most states regulate the harvesting of agricultural and forest products and have certain requirements for out-of-state shipments. Licenses are required for hauling between states as well as “for hire” hauling within states.

The Federal government or the states may impose quarantines to prevent the spread of insects, diseases, and other pests. Table 4 is a summary of regulations that affect the Christmas tree business in Washington, Oregon, and Idaho.

In addition, you should be aware of local requirements where you market trees. Some possible requirements would cover pest quarantines, retail sales, permits, and fireproofing.

Table 3.—Christmas tree grades^a

Factor	U.S. Premium	U.S. No. 1	U.S. No. 2
Density	Not less than medium	Not less than medium	Light or better
Taper	Normal (40-90%)	Normal (40-90%)	May be less than 40% or more than 90%
Foliage	Fresh, clean, and healthy	Fresh, clean and healthy	Fresh, fairly clean, and healthy
Shape	Well-shaped crown. Handle not less than 6" or more than 1 3/4" per foot of tree height.	Well-shaped crown. Handle not less than 6" or more than 1 3/4" per foot of tree height.	Well-shaped crown. Handle not less than 6" or more than 1 3/4" per foot of tree height.
Balance	Four complete faces free from damage or defects.	Three or more complete faces free from damage or defects.	Two or more adjacent faces free from damage or defects.

^aHeight of a tree is defined in terms of foot or half-foot steps, and it is measured from the base of the handle to a point on the leader not more than 4" above the apex of the cone of the taper. Taper of a tree is defined as the width of a tree expressed as a percentage of its height.

For further reading

To order PNW publications, enclose the amounts indicated and mail your order to either of these addresses:

Bulletin Mailing Office
Oregon State University
Corvallis, OR 97331-4202

Bulletin Department
Cooperative Extension Service
Cooper Publications Bldg.
Washington State University
Pullman, WA 99164-5912

Antonelli, A. L., ed., *Recognition and Management of Christmas Tree Pests*, Extension Bulletin 735 (Pullman, Washington State University).

Douglass, B. S., and G. H. Sander, eds., *Developing High Quality True Fir Trees*, Pacific Northwest Extension publication 226 (Corvallis, Oregon State University, 1982). Single copy 75¢ plus 25¢ postage.

Douglass, B. S., and G. H. Sander, eds., *Developing Sheared Douglas-fir Christmas Trees*, Pacific Northwest Extension publication 227 (Corvallis, Oregon State University, 1982). Single copy 75¢ plus 25¢ postage.

Pitkin, Frank H., and Vernon H. Burlinson, *Plant Your Trees Right*, Pacific Northwest Extension publication PNW 33 (Moscow, University of Idaho, reprinted 1979). Single copy 25¢ plus 25¢ postage.
William, R. D., Ken Brown, and D. V. Peabody, *Weed Control in Christmas Trees*, Pacific Northwest Extension publication 219 (Pullman, Washington State University, 1982). Single copy 50¢ plus 25¢ postage.

PNW pest control handbooks

Ask your Extension agent about ordering information, or write to either of the bulletin offices listed above.

Pacific Northwest Insect Control Handbook, a Pacific Northwest Extension publication, latest edition.

Pacific Northwest Plant Disease Control Handbook, a Pacific Northwest Extension publication, latest edition.

Pacific Northwest Weed Control Handbook, a Pacific Northwest Extension publication, latest edition.

Table 4.—Legal requirements for harvesting, selling, and transporting Christmas trees in Oregon, Washington, and Idaho^a

Requirement	When required	Where obtained
Oregon		
Notification of Operation, Oregon Forest Practices Act	All commercial cutting on wildlands not managed solely for the production of Christmas trees	State Forestry Department
Bill of sale	Transporting more than five trees	From seller
P.U.C. permit	Over 6,000 pounds gross wt.	P.U.C. offices
Report of Christmas trees harvested	Cutting from all ad-valorem-taxed private lands	County tax assessor
Nursery Inspection Certificate	Shipping quarantined species	State Department of Agriculture
Retail license permit	Most cities	City hall
Washington		
Specialized forest products permit	Cutting more than five trees	County sheriff's offices or Department of Natural Resources
Nursery inspection certificate	Shipping quarantined species	State Department of Agriculture
Forest excise tax form	Harvesting from natural (not plantation) Christmas tree lands	State Department of Revenue
Yield tax permit and yield report	Cutting from 1931 Reforestation Act classified lands	County assessor
Either a sales invoice, bill of lading "Authorization" for, or true copy of the specialized forest products permit	Transporting more than five trees	From seller for invoice; from carrier for bill of lading; from county sheriff or Department of Natural Resources for harvesting permit
Utilities and Transportation Commission permit	Contract haulers only	U.T.C. offices
Registration for state sales tax	All wholesalers and retailers	State Department of Revenue
Retail license or permit	Most cities	City hall
Idaho		
Bill of sale or proof of ownership	Transporting more than two trees outside incorporated cities	From seller
Seller's permit number for state sales tax	For all retail sales	State Tax Commission
Retail license or permit	Most cities	City hall

^aTrees entering California pass through inspection that may request bills of sale certifying ownership of trees. Insect and disease pest inspections may be made.

This publication was revised by William M. Proebsting, Extension Christmas tree specialist, Oregon State University, and Donald Hanley, Extension forestry specialist, Washington State University. Trade-name products are mentioned as illustrations only. This mention does not mean an endorsement of such products by the participating Extension Services, and it does not suggest any discrimination against products not mentioned.

Published and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914, by the Oregon State University Extension Service, O. E. Smith, director; Washington State University Cooperative Extension, J. O. Young, director; the University of Idaho Cooperative Extension Service, H. R. Guenther, director, and the U.S. Department of Agriculture cooperating.

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