

Growing Christmas Trees

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Growing Christmas Trees

in the Pacific Northwest—like growing other agricultural crops—entails risk and work. Trees take time to mature, consumer preferences change, and production and demand cycles defy prediction. Many landowners looking for a new crop will find that growing Christmas trees is not for them. Those who decide to continue should consider this publication as a primer. Your work and investigations are just beginning. We will direct you to additional resources to help make your search more productive.



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History and trends

Christmas trees are an enduring holiday tradition. U.S. producers supply about 35 million trees annually. The past few decades have seen the Pacific Northwest's rise to prominence as the leading Christmas-tree-producing region in the United States. With a combined annual production estimated at more than 11 million trees, Oregon, Washington, and Idaho produce more than one-quarter of all Christmas trees grown in the country.

Much has changed over the years. In the 1940s, Christmas tree production in the region was limited mostly to trees cut from forest thinnings. That changed as production shifted to plantations where trees were closely spaced and pruned to develop higher density, increasing the quality standards and yields per acre.

During the 1950s and '60s, the Christmas tree industry grew. With the economy booming, and transportation easier, Pacific Northwest growers began to compete successfully with Scots pine and true firs produced in the Great Lakes states. At first, Pacific Northwest trees replaced lower quality forest trees in markets in California and the Southwest. Then they began to replace sheared trees from the Great Lakes states, particularly Michigan, which at the time was the leading producer of Christmas trees.

The 1970s saw unprecedented growth in the plantation Christmas tree industry in western Oregon and Washington. Thousands of new acres were added, particularly in the Willamette Valley of Oregon. Growers perfected the sheared Douglas-fir Christmas tree and made it a staple of Christmas tree markets throughout the United States. Growers with better sites also began to grow more noble fir, commanding a premium price.

The 1980s started well but finished with the industry mired in oversupply. Many new trees entered the marketplace leaving some growers with no outlets to sell trees, even at depressed prices. Some Christmas tree fields were abandoned to grow into timber stands or cleared and replanted to other crops, at high cost to the landowner.

As the industry begins the new millennium, fresh hope abounds, yet change continues. The focus of production in the region has switched from mostly Douglas-fir to noble and other true firs. Research in tree keepability, pest management, and genetics continues to push the industry forward and to keep it competitive with other regions of North America.

Judging opportunity and risk



Most people visit a Christmas tree farm only one day a year. It looks like a great business and lifestyle: people give you money and leave with trees. Plus, you might get a break on property taxes. Few see the years of work, revenue delays, and market risk that experienced growers know are part of growing this crop.

Is growing Christmas trees for you? Let's consider issues new growers must confront.

Motivation

Success requires sustained motivation and an understanding of the growing process. Potential new growers often first ask, "Where can I get trees to plant?" Or, they think first of reducing property taxes. A more useful question would be, "How can I learn more about the industry to be successful?"

Simply having the land is seldom reason enough to grow Christmas trees. Spend some time apprenticing with a long-time grower. There is probably no better way to evaluate your motivation and chances of success than working on a producing farm.

Time commitment

Growing Christmas trees is labor intensive. It is more like adding a second job than adding a hobby. How do you spend time now, and what are you going to drop to work on your tree farm? Or, do you have extra capital to pay others to do the work? As a rough rule, on small plantations some kind of work needs to be done about every 3 months. On a young 4-acre field, plan on spending a full 2 days every 3 months. As the trees grow, the time

commitment increases because larger trees require more culturing and maintenance. For example, shearing 300 mature trees can be a full day's effort.

Evaluating your site

The most common reason plantations fail is that the land is poorly suited for Christmas trees. If you plant before you've carefully evaluated and prepared the land, you may compromise tree quality and usually you'll reduce future profits. Good Christmas tree sites have these characteristics.

- **Open to full sun** Trees shaded by other trees or brush typically perform poorly.
- **Adequate rain** Trees need 25 inches or more of rain on most soils unless they are irrigated.
- **Well drained** No standing water. Different species have different tolerances, but well-drained soil is best.
- **Level or only moderately sloping** Slopes should be no steeper than a tractor can safely work unless you plan on using hand crews or helicopters. Steeper slopes also interfere with straight tree form and crown uniformity.
- **Good soil pH** The pH should be between 5.1 and 6.5.
- **Adequate soil nutrition** Both macro- and micronutrients are important. (See *Fertilizer Guides* in "For further information," page 38.)
- **Room for rooting** The deeper the soil the better, but you'll need at least 18 inches of well-drained soil.

- **Good site preparation** Sites must be cleared of stumps and competing brush. Many experienced growers plant only after deep ripping, disking or plowing, and leveling.
- **Adequate roads** All-weather roads are expensive but a key ingredient in any Christmas tree operation. Harvest and other management operations rely on your being able to get to and from your farm in wet weather.
- **Suitable location** If you are going to sell U-cut trees, the farm needs to be close to population centers or so interesting that you can coax distant customers to your farm. For wholesale operations, good roads are a must. Generally, that means no steep grades, tight curves, poor road surfaces, or weight limits on bridges that may limit the use of large trucks and trailers. If the farm is more remote, it can be difficult to locate contractors, to interest buyers, or to prevent vandalism. Wildlife damage can be a problem at any site.

Marketing options and decisions

You have two Christmas tree marketing options: on-farm U-cuts, and sales for off-farm distribution. The off-farm distribution can take many forms: mail order, direct retailing, selling to tree brokers, or contract sales through established growers or wholesalers.

The type of marketing you choose will dictate some of your planning and layout decisions. For example, U-cut farms typically require more all-weather roading, a wider mixture of tree species and sizes, closer proximity to customers, and growers who don't mind dealing with vehicles, signs, customers, long open-for-business hours, and all the issues of inviting customers to your farm.

For off-farm sales, you'll need to consider the buyers' range of needs. For example, you must establish staging areas for baling and loading trees and build roads that can handle semi-truck traffic. It's essential to arrange labor and contractor availability before harvest begins. Also, these buyers often need larger quantities of trees—often a truckload or more.

Risks

Growing Christmas trees entails some risks that may be hard to control.

- **Customer taste** Customer preference in trees can be faddish. Years ago, Scots pine was popular. Now it is hard to sell. Douglas-fir was the number-one tree in the Northwest; now noble and other true firs dominate the market. Heavily sheared, dense trees are popular in some markets, but in others a more open, layered tree is preferred.
- **Vandalism/theft** Good fences, alert neighbors, and secure entrances and exits help reduce theft problems. Yet each year growers report theft, and once trees are removed they are hard to trace and identify.
- **Shipping and quarantines** Introduced pests have affected tree sales. Gypsy moth quarantines hurt sales in some areas in the 1980s and '90s. Some states and most foreign countries have inspection requirements for some or all species (see "Christmas tree licensing and inspections," page 33). Pine species, due to certain insect pests, may require trapping or inspections in years prior to harvest.
- **Market risk** Christmas tree markets seem to go through boom and bust cycles. Tree demand is rather fixed, while supply fluctuates with growers' plantings. Likewise, production costs such as labor and pesticides steadily increase.
- **Weather, pests, and fire** Early frosts and summer droughts are common problems most Christmas tree farmers face. Disease, insects, and animal damage are potential problems throughout every rotation. Fires, though not common, can and do strike plantations. Overly wet soils are problems for many true fir species.

Christmas tree management cycle



Christmas tree growing tasks

Success in growing Christmas trees is no mystery. It takes planning, hard work, and some cooperation from forces outside your control (weather, pests, markets, etc.). One way to tip the balance in your favor is to understand the tasks required and to make sure you do them in a timely and professional manner.

Figure 1 identifies the general tasks involved in producing a crop of Christmas trees. If you are like most growers, you will plant a new crop each year until you have established the whole property in a rotation. The cycle is repeated for each new field that you plant. The number of annual tasks can be significant once the property is in full rotation (see “Getting the work done,” page 18).

Begin planning at least 1 year before planting in order to schedule ground preparation and to order the desired quantity and genetic sources of trees.

Farm planning

Just as the foundation is the most important part of a building, a plan is an essential part of successful Christmas tree farming. Matching species to the site, deciding how to prepare the soil, testing and adjusting soil nutrient balance, choosing the best tree spacing, and other issues are best addressed before trees are in the ground. Also, consider

marketing as a basic component of your farm plan. Think through questions such as how are you going to sell the trees? what species are selling well? and who are your intended buyers?

Finally, how are you going to pay for all the costs of getting trees ready for harvest? Depending on species and growing site, you might make investments for many years before you see any returns.

Think through these issues well ahead of time and write down your conclusions for future reference. A good plan does not have to be fancy, but it should include a description of your operation and a map of your property with important features and facts noted; e.g., roads, streams, and property boundaries (Figure 2, page 6).

Task	Year of Operation						
	1	2	3	4	5	6	7-10
Farm plan, tree ordering	🌲						
Site preparation	🌲						
Planting		🌲					
Vegetation management	🌲	🌲	🌲	🌲	🌲	🌲	
Culturing		🌲	🌲	🌲	🌲	🌲	🌲
Fertilizing			🌲	🌲	🌲	🌲	🌲
Managing pests		🌲	🌲	🌲	🌲	🌲	🌲
Marketing				🌲	🌲	🌲	🌲
Harvesting				🌲	🌲	🌲	🌲
Field renovation							🌲

Figure 1.—Principal tasks and their timing on a Christmas tree plantation.

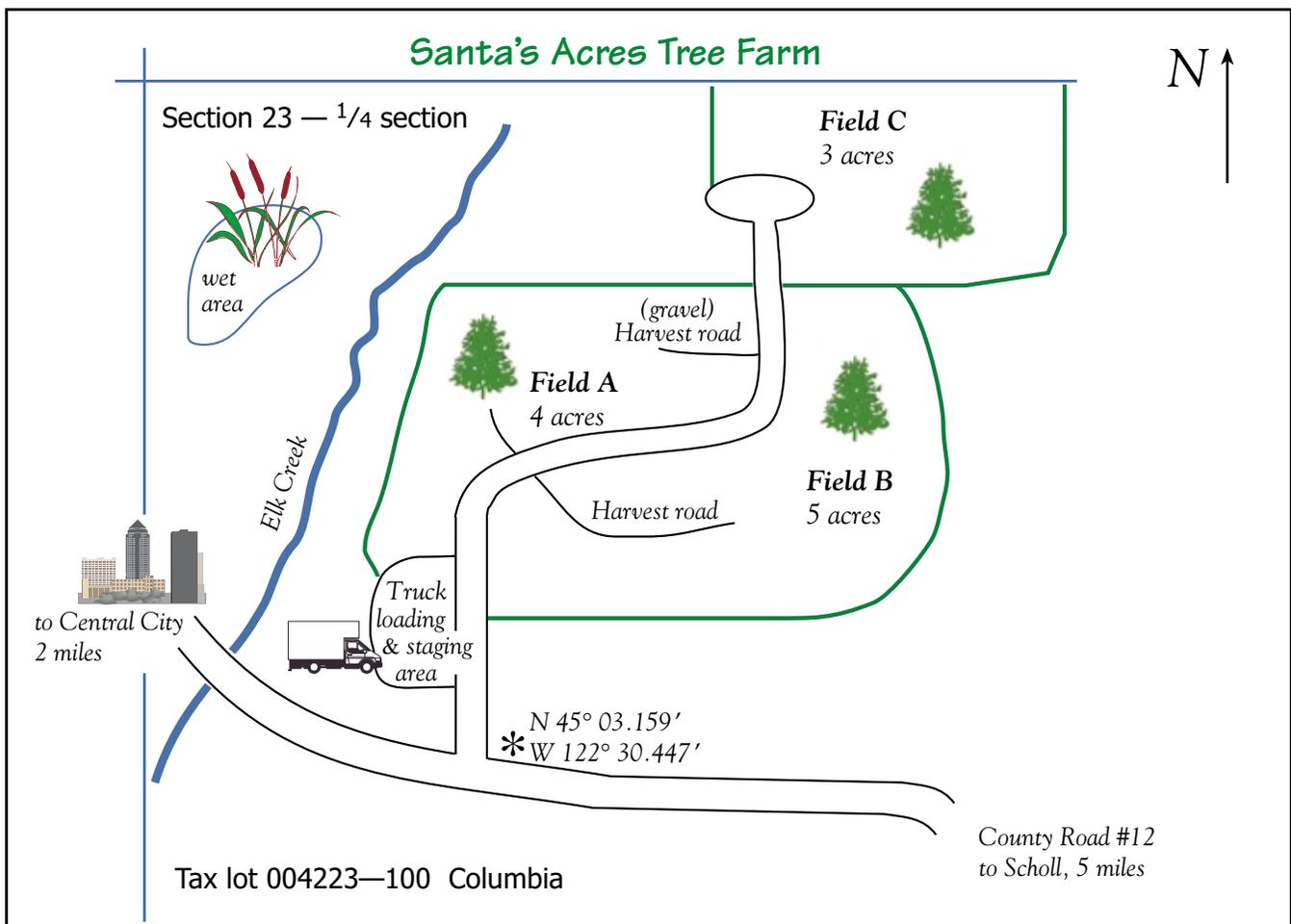


Figure 2.—Santa's Acres map (above) and field records (below).

Sample field records

Field	Site Prep History
A	Ripped by G. A. to 2' depth on Sept. 1, 2000 Limed with 2 tons ag lime on Sept. 10, 2000 (see soil test #6) Disked 6" by G. A. on Sept. 20, 2000 Planted to spring oats by Farmer Bob — 20 lb/acre — Sept. 21, 2000
A	Planting information Planted with 2-0 bareroot noble fir from XYZ Nursery. Bag codes NF 053 1.5. Seed collection by ABC Seed Co. — Siletz Drainage in 1997. Picked up from nursery on March 10, 2001. Shovel planted March 14, 2002, at 5.5 x 5.5 spacing.
B	Weed control history March 20, 2002 — Applied Brand X herbicide (2 quarts/acre) with XYZ sprayer at 15 gal/acre with Tk 2.0 turbo jet flood tips. Rained 6 hours after application.
C	To be planted in 2004. Ordered 4500 seedlings — Stott Mountain noble fir, from ABC Nursery, October 2001. \$350/M. Paid \$500 down.

Sample expense record

Date	Field	Notes	Cost
9/1/00	A	G. A. ripped to 2' — \$150/hour. Check #1201	\$450

Ordering seedlings The best stock types and sources of desirable species always seem to be in short supply. Ordering trees at least 1 year in advance is almost essential if you want to get the best trees. Growers who wait until planting season usually end up planting whatever is available, and they may be setting themselves up for a crop cycle of misery. Trees not well suited to a site or that do not come from sources known to produce good Christmas trees can increase costs and reduce tree value dramatically. See “Popular species in the region,” page 21, and the references on pages 38–39 for information on seedling sources.

Site preparation

Your soil is the basis for your operation’s productivity, so it’s important to have it in top shape before you put trees in the ground. Drainage, nutrient, and weed problems are best addressed first thing.

Good soil drainage is particularly critical on high-rainfall sites in western Oregon and Washington and on mountain sites in Idaho. Nearly all Christmas tree species need good drainage. Even species such as Scots pine may tolerate poor drainage yet prefer better drained sites.

A number of factors can cause poor drainage, some correctable and some not. If your site has heavy (clay) soils and a topography that tends to collect water (Figure 3), you might not have a good site for a Christmas tree farm. The presence of wetland plants, such as rushes and buttercups, indicates that the site is too wet for Christmas trees. You can get help identifying your soil type and drainage from your local office of the USDA Natural Resources Conservation Service (see “For further information,” page 40).

If drainage is impeded because of soil compaction or poor up-slope water management, drainage usually can be corrected by some combination of tillage, ditching, and in some cases a grid of drain lines across the site.

One of the best practices on clay loam hill soils is to deeply rip the soil profile with a winged subsoiler or other ripper. To be effective, ripping must be done during the

summer dry period and should reach 2 to 3 feet deep. The objective is to fracture the soil into coarse chunks, break through any resistant layers, and promote better drainage.

Surface tilling will not help trees root deeply, but it can reduce weed competition and might improve surface moisture-holding ability. In any soil tillage program, it is important to remember that overworking the soil can break down its natural structure and result in compaction and/or erosion. Also, once trees are in the ground, tillage can remove root tips and damage tree growth.

When you are working up the soil (plowing, tilling, disking) is a good time to add non-mobile nutrients, such as calcium, phosphorus, and potassium, if needed. These nutrients should be incorporated into the soil to benefit tree growth. It’s also a good time to apply lime to raise the pH of excessively acid soils.

Acidifying (lowering the pH) of alkaline soils is seldom practical or cost effective. Alkaline desert soils in eastern Washington and Oregon and

southern Idaho are not well suited for Christmas trees. For instructions on soil sampling and nutrient management, contact your local Extension office (see also “Fertilization and tree nutrition,” page 13). You also can get help from local farm services companies and consultants.

The best time to get problem weeds under control is before you plant. Heavy mats of grass and/or woody species such as blackberries can be removed more easily before trees are in the ground. A good plan is to clean up the site in spring and summer, prepare the soil in the late summer, and plant the following winter.



Figure 3.—High winter water tables make part of this site unsuitable for Christmas trees.

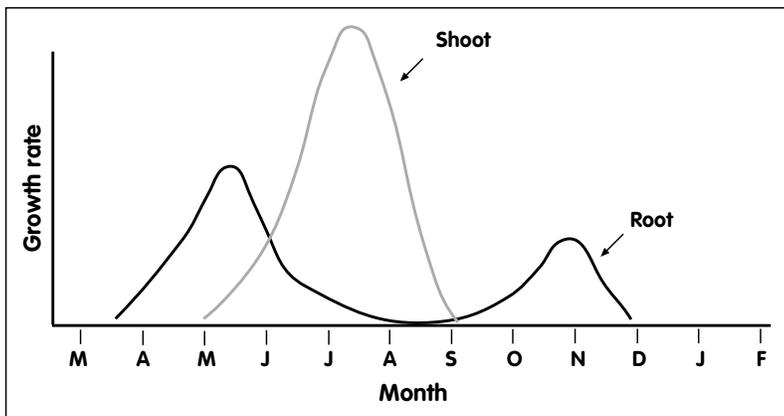


Figure 4.—Relationship between growth periods of conifer roots and shoots.

In high snowfall areas such as northern Idaho, most growers plant in early spring.

Irrigation Commonly, Christmas trees are a dryland crop, yet a few growers irrigate their trees. In general, irrigation is used to help trees through the dry season or to help newly planted trees survive. Irrigation usually is in a few heavy doses at 10-day to 2-week intervals in midsummer, rather than trying to keep soil moist at all times. Watering late in the summer may predispose trees to damage from early frost, so discontinue watering by mid-August.

Overhead and trickle systems are the most common types found on Christmas tree plantations. Overhead sprinklers have several advantages. Portable systems can be moved from one field to another as needed, reducing investment costs. Trickle systems can be more expensive and complicated but have the advantage of concentrating the water on the trees instead of also watering other vegetation. Trickle systems also may reduce foliar diseases associated with wet needles.

Planting

Once soil is properly prepared, tree planting may proceed. Seedlings generally are planted in late winter or early spring. This allows nurseries time to lift the seedlings at the trees' maximum dormancy. Seedling growers in inland areas usually lift in late fall and refrigerate seedlings for spring planting. Trees lifted at that time can be stored several months in a properly equipped cooler. Seedling technology has evolved in recent years, allowing nursery managers to physiologically condition

seedlings for fall, winter, or spring planting. The root-top-growth diagram (Figure 4) helps to time planting. In the winter-spring period, trees should be planted so roots can grow to support the aboveground vegetative growth. In the fall, planting should accommodate late-season root growth. This often requires close coordination with the nursery, and the site cannot be prone to frost heave.

If your ground is properly prepared, you can plant trees west of the Cascades from January to March and from February to April inland. Hand-planted fields can be established any time during this period when the ground is not frozen. Machine planting requires waiting until the soil dries enough to permit equipment access. During wet springs, this can push planting dates into April or even May, which may limit the crop's growth and survival.

Whatever planting date you choose, also consider tree storage and handling. Many a tree-planting operation has been spoiled because trees were left in the sun or not properly refrigerated while they waited to be planted. Keep trees cool (34° to 37°F) until they are planted. Even at the planting site, do not put bags of trees in direct sun. If trees will be planted within 10 days or so, temporary seedling transplanting (heeling-in) may be



Figure 5a.—Hand planting.

satisfactory. For more information, see publications listed on pages 38–39.

Trees commonly are planted using shovels, planting hoes, power augers, and tractor-pulled transplanting machines (Figures 5a and 5b). The method best for your operation depends on how many trees you need to plant, field topography, and equipment and contractor availability. Hand-planting equipment works best for smaller fields and for interplanting. Machine planting gives the lowest cost and quickest planting but is limited to times when the soil is not too wet and when contractors are available. Machines may do a poor job of closing the planting slot on steeper slopes and in heavier, silty, or clayey soils. So, watch closely to make certain that trees are properly planted.

Another planting consideration is field layout. Arrange trees in straight rows. Growers continually debate what is the “right” spacing to use. Ultimately, the answer depends on harvest tree size and on equipment access. The spacing you choose must allow for the production of high-grade trees. Remember the adage, “quality sells.” Table 1 indicates the number of trees per acre at various spacings.

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

Spacing (feet)	Planted solid	After 10% reduction for roads
2.5 x 2.5	6,929	6,272
3 x 5	2,904	2,613
3 x 6	2,420	2,178
5 x 5	1,742	1,568
5 x 6	1,452	1,307
5.5 x 5.5	1,440	1,296
6 x 6	1,210	1,089
7 x 6	1,037	933



Figure 5b.—Machine planting.

A tree 6 to 7 feet tall needs a minimum field spacing of 5 to 5.5 feet. Tabletop trees (height 2 to 3 feet) can be planted at about 3 x 3-foot spacing if you don’t need tractor access. You might consider leaving more room between rows than within rows (e.g., 6 feet between rows, 5 feet between trees). Planting too closely often lowers profits by increasing pest problems and by making tree management more difficult.

Whatever your spacing, you need to mark the field for the tree planters. Some people use specially prepared cables or ropes that have a mark where each tree should go. These can be stretched over the site and the planting spots marked with flags, paint, lime, or flour (Figure 6, page 10). Mechanical tree planters can be calibrated to give the desired tree spacing. Remember to leave space for access roads and to allow equipment to turn at row ends.

Vegetation management

One dilemma Christmas tree growers face is finding the right balance between soil protection and weed competition. The combination of dry summers in the Northwest and a non-irrigated crop makes weed control a necessity in Christmas tree plantations. Weeds compete with trees for space, light, nutrients, and water. Some weeds, such as bracken fern, harbor diseases that can infect your trees. The more weeds you remove—right up to the point of totally bare ground—the greater the benefit to Christmas tree species.



Figure 6.—Field layout using flags and tape measure.

On the other hand, keeping some vegetation can provide a number of benefits, including reduced soil erosion and a less muddy surface during harvest. It is possible to control competition and get the benefits of partial vegetative cover by controlling only the weeds within the tree row or around each tree. Some growers plant less competitive, more desirable ground vegetation between tree rows. The dripline of the tree crown is a good

guide for maintaining a weed-free zone (Figure 7).

Plant trees into a weed-free environment. Maintaining a weed-free area around the trees for at least 3 years is essential to allow trees to grow roots necessary for good survival and growth. Weedy tree plantations suffer from poor initial survival and slow growth.

Methods to control vegetation include light tillage, mowing, and herbicides. Some growers also are testing landscape fabric and mulches for smaller plantings. Herbicides are, by far, the most common method of weed

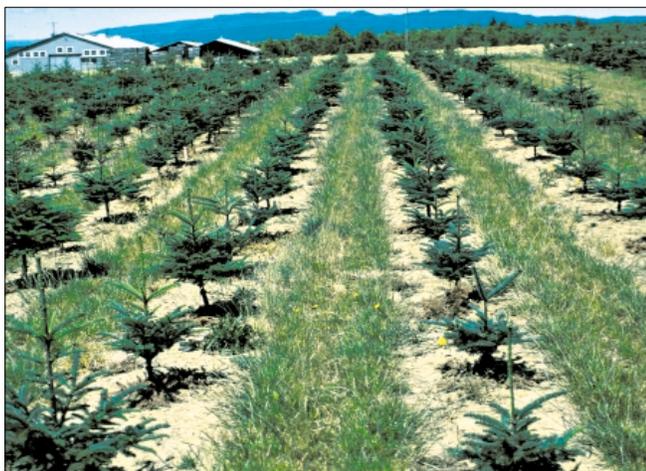


Figure 7.—Weed control along tree rows

management. A variety of soil-active and contact herbicides are labeled and approved for use in Christmas trees by the department of agriculture in your state. Before applying herbicides, it's a good idea to discuss your proposed application with a licensed pesticide

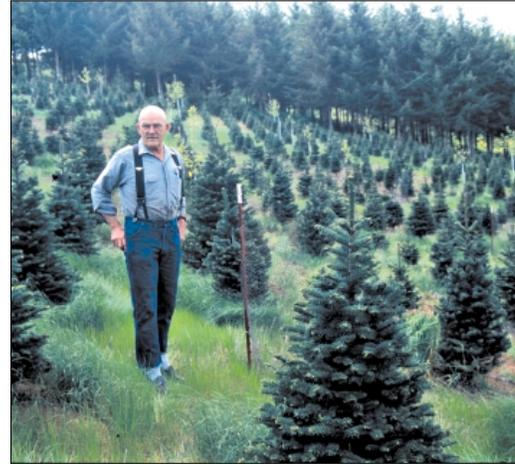


Figure 8.—Some grasses left unsprayed for soil protection.

consultant or an experienced grower. Make sure your plan fits the species you are growing. Remember, the pesticide label contains the rules governing proper use.

Soil management and cover crops As trees become better rooted and approach harvest age, weed competition is less an issue. Instead, you might want some living cover on the soil surface to facilitate harvest. Vegetation management the last couple of years of the plantation cycle can consist more of selective weed removal: eliminate species that will cause problems for the crop, but leave those that provide ground cover (Figure 8).

Growers can use a number of types of ground cover. A few grow cover crops between tree rows during the entire rotation. Others grow cover crops during the soil preparation phase and then remove the cover before planting. Still others confine their covers to strategically located strips across the field and along its edges. If you use cover crops across the plantation, continually cut them short to avoid harboring rodents that may gnaw bark or clip tree tops.

Soil that is tilled or heavily disked and left unplanted in winter should be seeded with a fast-growing winter grass or cereal grain that can hold soil in place in wet weather. Planting a cover crop between crop rotations can benefit soil health by improving soil tilth and biological activity.

Culturing

Ever since Christmas trees shifted from a forest crop to a farm crop, growers have been developing new methods and equipment to culture every tree into a high-quality Christmas tree. Tree culturing:

- Controls excessive growth
- Increases density of branches and foliage
- Corrects imperfections in tree shape
- Makes nearly every planted tree a salable Christmas tree (inevitably, some trees just will not cooperate)

During the first couple of years, your focus will be on replacing dead or sick trees, removing multiple leaders, and keeping fields free of weeds and pests. Be careful not to remove too many branches during this growth stage or you will stunt tree growth. Your objective is to get the tree up to a height where you can begin shaping it into a Christmas tree. Basic culturing techniques for the rest of the tree cycle include basal pruning, leader length regulation, and side shearing. Figures 9a, 9b, and 9c illustrate growth and culture from planting through final culturing.

Basal pruning The objective of basal pruning, or “handling” as some call it, is to create a clear length of stem at the tree base which can be inserted into a Christmas tree stand (Figures 10a and 10b, page 12). Ideally, this length should be 10 to 12 inches for a tree that’s 6 feet or taller. On shorter trees, leave about 2 inches per foot of height.

Basal pruning also benefits the tree. It makes weed control, by mowing or herbicides, easier and more effective. Removing low branches improves air circulation through the tree, which is important in reducing some foliage disease problems.

Basal pruning is commonly done when tree leader length reaches approximately 10 to 12 inches. Growers frequently debate the merits of how much and when to basal prune. Some growers basal prune trees in two lifts (stages) in different years. Other growers wait and sell the basal branches as bough material if markets are available. Regardless of method or timing, basal-pruned branches should be cut near the stem, to prevent resprouting and recutting.



Figure 9a.—Newly planted field.

Leader length regulation

Regulating leader length is essential on most Christmas tree sites in the Pacific Northwest, where trees may grow as much as 3 to 4 feet per year once they are established.

Leader length control lies at the heart of the art and science of Christmas tree growing. A warning to the beginning grower: it is difficult to rely on general rules because so much

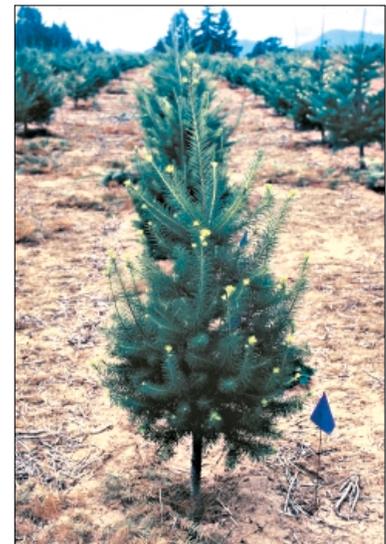


Figure 9b.—Douglas-fir after basal pruning and first shearing.



Figure 9c.—Top-quality Douglas-fir after several years of culturing.

depends on individual tree biology, markets, and grower skills. That said, once leader control begins, many growers retain about 10 to 14 inches of leader each year. The cut length depends on desired final tree height, number of buds on the leader, tree quality and vigor, density desired, and grower experience. If you do not have good bud set on the leader, reduce the leader to a length that will have adequate buds. Trees that grow slowly at first and then bolt during the last couple of years tend to have dense lower sections and open tops, which is not desirable in the marketplace.

Control leader length by clipping the leader once annual growth stops (Figure 11). Timing can be important. Leaders on fir and spruce respond best to cutting during the late succu-

lent stage, once buds have been set and the leader stands up straight (late July and August). Pine trees are shaped earlier in the year when the leaders (called candles) have elongated and the new needles are about half the length of last year's needles (June to early July).

Hormonal growth regulators or leader scarring are methods of leader length regulation that, to date, have shown inconsistent results.

On some sites, some species will have a second flush of growth called *lammis* or late-season growth.

Treating this type of growth, particularly in the tree's leader, is discussed in more detailed grower guides (see VTP 5,

PNW 226, and PNW 227).

Side shaping/shearing

Once the tree is about 2 to 4 feet high, growers typically begin side shaping and shearing to regulate the length of lateral

branches and

to give the tree the conical shape that the marketplace expects.

If you are growing tabletop trees or your trees are getting overly wide, shaping should begin earlier. For larger trees, shearing can begin when trees become too "fat" or branches exceed the suggested taper.

Although there is no ideal shape for all Christmas trees, the commonly accepted taper is about 40 to 60 percent. Taper is width divided by height, so a 5-foot-tall tree with a 60-percent taper would be 3 feet wide (Figures 12a and 12b).

The strategy for shaping Christmas trees varies widely by species and among growers. Though any species can be sheared, Douglas-fir, pines, spruces, concolor fir, and fraser and grand firs usually are sheared annually using a knife or mechanical shearing tool. Hand clippers or hand-picking of branch tips are used to shape noble, Shasta, Nordmann, and Turkish fir. The hand-picking retains a more "natural" appearance yet is labor intensive. Some growers knife-shear all species yearly, or perhaps hand-pick or hand-clip the nobles in only the harvest year.

Timing can be very important. Pines need to be shaped when new needles are about half as long as the previous year's needles. True firs generally are sheared in summer. Hand-picking and branch tipping are done during the early succulent stage of growth.



Figure 11.—Leader cutting to selected bud on Douglas-fir.



Figure 10a.—Before basal pruning.



Figure 10b.—After basal pruning.

Douglas-fir may be sheared summer through fall. Many growers like to shear their harvest trees first. The longer shearing is delayed, the more woody the twigs become, making shearing more arduous and time consuming.

For more information on culturing, refer to publications listed on pages 38–39.

Fertilization and tree nutrition

Two critical times to check tree nutrition are before site preparation and after trees are established. Before site preparation, test the soil and add needed amendments. Many nutrients are not mobile in the soil and therefore need to be incorporated before you plant. During tree rotation, test foliage samples to determine whether trees are getting needed nutrients.

Before site preparation Check pH, phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), boron (B), and SMP buffer (lime requirement). Consult fertilizer guides and crop advisers once you know your soil nutrient levels. Add needed nutrients when they can be incorporated into soil, typically during site preparation.

After planting After the trees have been established, monitor foliar nutrients carefully and add nutrients as needed. Various guides (see page 38) can help you sample soil and foliage, interpret test results, and plan fertilizer additions. Foliar samples commonly are collected in September and October. Soil samples can be collected anytime.

Traditionally, Christmas tree growers add nitrogen fertilizer the last 2 years of the plantation cycle to improve color. Recent research, however, has pointed out that different strategies are important for different species. Likewise, irrigation may change nutrient demand and alter the fertilization regime.



Figure 12a.—Before shearing.



Figure 12b.—After shearing.

University of Idaho studies of grand fir trees in the Inland Empire found little response to additions of nitrogen, phosphorus, potassium, or sulfur other than a small improvement in color from the nitrogen. A similar OSU and WSU study in western Oregon and Washington found nitrogen fertilizers improved color on noble fir and Douglas-fir and slightly improved growth of Douglas-fir on shallow hill soils.

Blue spruce (*Picea pungens*), in contrast, does respond strongly to fertilization. Nitrogen applications improve color, growth rate, and form. Fall applications of slow-release fertilizers to field-grown trees have proven especially effective on sites in Idaho.

Managing insects and diseases

Christmas tree growers must contend with any number of insect, disease, and environmental problems during the growth cycle. Discussed briefly below are a few of the common problems of

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. **Precisely follow label instructions** (and any other instructions you have).
- **Be cautious** when you apply pesticides. Know your legal responsibilities as a pesticide applicator. **You may be liable** for injury or damage resulting from pesticide use.

Christmas trees in the Northwest (also see publications listed on pages 38–39).

Foliage problems Several species of fungi attack Christmas tree needles, causing yellowing and needle loss. Swiss needle cast attacks only Douglas-fir but is a serious problem in western Oregon and Washington (Figure 13).

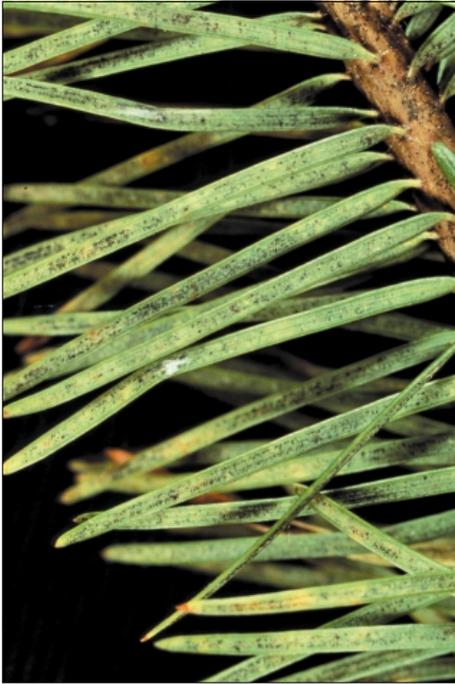


Figure 13.— Swiss needle cast fungus.

Its signature symptom is loss of interior needles.

Rhabdocline needle cast is another needle disease on Douglas-fir, causing needle loss throughout the region. Offsite seed sources are particularly susceptible to this problem.

If you are growing pines, the needle diseases to watch for include *Lophodermium* and *Lophodermella*, both of which can be devastating to pine plantations. Likewise, the foliage disease *Rhizosphaera* sometimes affects spruce plantations. Fungicides can control all these diseases; generally, apply fungicides just after budbreak.

Needle rusts also can be a problem, especially for true fir growers. Rust fungi can be a problem when the host tree and an alternate host are near each other. Common alternate hosts of

rust fungi for true firs are huckleberries and ferns. If you cannot eliminate alternate hosts from your area, fungicides are available to protect the trees from infection.

Another rust fungus is the blister rust fungus associated with eastern and western white pines and other five-needle pines. It's a nearly impossible task to remove all alternate hosts (currants and gooseberries) from within half a mile of the plantation. Blister-rust-resistant strains of white pines are now available.

A non-disease-related problem of noble and grand firs is current-season needle necrosis (Figure 14). Thought to be caused by calcium deficiency, the necrosis shows up in early summer as browning of current-season needles. The problem tends to be very site specific and weather related and also has an established genetic connection. As new strains of noble and grand firs are developed, it is likely that genetic selection will partially control this problem.

Root rots Of the fungi that attack and destroy tree roots in Christmas trees, the most serious are in the genus *Phytophthora*. This genus of fungi includes several species that can kill several true fir species grown for Christmas trees. Most prevalent are the species that kill noble and Shasta fir. Other root- and stem-damaging fungi of note include *Heterobasidion annosum* (particularly on grand and noble fir) and *Armillaria* on Douglas-fir. The best insurance against *Phytophthora* root rot is to choose a site with excellent soil drainage and to choose species that are well adapted to your site and soil conditions. Removing stumps and/or treating them with fungicides are strategies for annosus root rot control.

Insect pests Aphids probably are the most damaging of the insects that attack Christmas trees, particularly grand and noble firs (Figure 15). The best medicine for aphids and for other insect pests is to monitor their populations carefully and treat only when needed because natural predators and parasitic organisms are important controls.

Douglas-fir growers should be aware of potential damage from needle midges and the

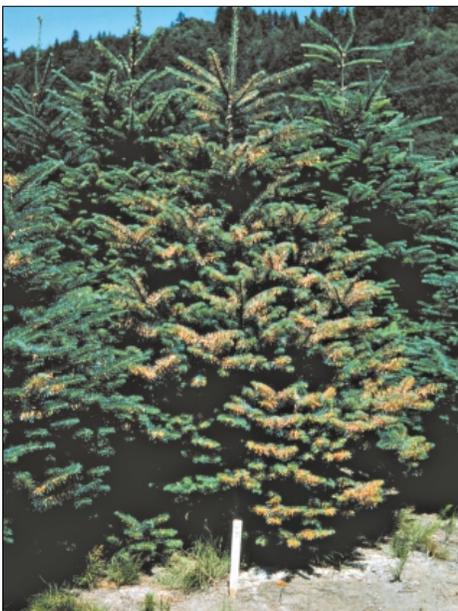


Figure 14.—Current-season needle necrosis on noble fir. (On living trees, the brown color of current-season needles stands in vivid contrast to older needles, which remain green.)



Figure 15.—Aphid feeding on true firs.

Cooley spruce gall adelgid. Another species of adelgid, the balsam woolly adelgid, damages noble and other true firs. Occasionally, these insects can damage a plantation significantly.

cantly.

Mites also must be monitored. Many mite species attack Christmas trees, and no tree species seems immune. Invisible to the naked eye, these tiny creatures can destroy needle quality by browning them.

Below-ground insect pest problems include weevils, such as the strawberry root weevil, June and rain beetles, and root aphids. Most troubling about these pests is that they seldom are spotted before trees are yellowing and showing signs of stunting.

Finally, a number of moths, borers, weevils and other pests can attack trees. Your best protection is to inspect your plantation often. Early intervention can avoid catastrophic loss and can reduce treatment costs.

Marketing

You should have a general market and product type in mind (e.g., tabletop trees, U-cut sales, off-farm sales) before you plant your trees to ensure that the species, spacing, and culturing will produce high-quality trees for your target market. Investigate and cultivate possible buyers years before you plan to sell trees.

During the year of harvest, plan for field time to complete grading, tagging, and inventorying your trees. You also need to have buyers visit your plantation(s) and inspect tree quality and quantity. Many buyers prefer to do their own tagging, but growers should be cautious that buyers are not “cherry picking” only the best trees while paying only field-run prices. The price paid to growers typically has two components: grade and height. The grades buyers use vary tremendously. The USDA has adopted national grading standards (Table 2), but they are subject to considerable interpretation in actual situations. Height measurements also are subject to interpretation. For example, some buyers measure tree heights to a “fold” (where folded whorl branches hit the leader), some to where the shearing outline

Table 2.—USDA Christmas tree grades.*

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%)	Outside normal range
Foliage	Fresh, clean, healthy	Fresh, clean, healthy	Fresh, fairly clean, and healthy
Shape	Well-shaped crown; handle not less than 6 inches or more than 1.75 inches per foot of height	Well-shaped crown; handle not less than 6 inches or more than 1.75 inches per foot of height	Well-shaped crown; handle not less than 6 inches or more than 1.75 inches per foot of height
Balance	Four complete faces free of damage or defects	Three or more complete faces free of damage or defects	Two or more adjacent faces free of damage or defects

* Tree height is in 1-foot or half-foot increments, measured from the base of the handle to a point on the leader not more than 4 inches above the apex of the cone of the taper.

intersects the top, and some to the top of the leader (Figure 16, page 16).

When you talk with prospective buyers, it is vital that everyone clearly understands how tree heights are to be determined and that you agree on grading standards, tree marking colors, timing and method of payments, how and by whom disagreements will be resolved,

and when and how the various tasks will be performed.



Figure 16.—Measuring harvest trees.

Harvesting

Finally, after years of work and waiting, you are ready to reap your harvest of Christmas trees. Christmas tree harvesting is usually a hectic time, made

worse by unpredictable weather. A successful harvest uses a minimum amount of time to cut, sort, bale, and get the trees on their way to market while at the same time avoiding damage to the soil.

If you plan to sell your trees wholesale, the first steps in the harvest are tagging and cutting the trees. Cutting generally is with a lightweight chain saw or with circular saws mounted on rotary brush cutters. Whatever tool you choose, make sure your equipment is in good running order and that you have backups available. Time is very limited during harvest, and you cannot afford to wait for repairs or parts.

Once trees are cut, they usually are yarded to a central location for baling and loading. This can be done by hand for shorter distances but might involve tractors, trucks, and even helicopters for greater distances or larger operations. More than any other harvest job, yarding has the greatest potential for damaging soil and tree quality. Tractors or other equipment (Figure 17) driven on wet soils can

create compaction and/or erosion problems. Also, mud on trees is a significant problem for Christmas tree retailers.

Baling wraps trees tightly with string or mesh netting to protect them during shipping and to increase the number of trees that a truck can carry. Baling contractors might be available, but make arrangements months ahead. If you have a very large operation, you will want your own baler. For some buyers and/or export destinations it is necessary to shake trees to remove pests, dead needles, and other materials before baling. Mechanical shakers are available. Trees also can be measured and tagged during this step.

Arranging for trucks, preparing your property to accommodate them, and getting them on the road in good order are tasks that require planning. Make sure that trucking companies have good directions to your farm. Also, keep in mind that weather and bad roads may delay trucks. Veteran growers admit that managing the loading operation can be stressful.

When a truck arrives, you need enough help (about four people plus a tally person) to load it promptly and to make sure that the correct quantities and sizes of trees are on board. Trees for local or regional markets can be covered with tarps and shipped in open trucks. For greater distances, trees generally are shipped in refrigerated vans. Make sure to keep good records about the entire loading operation. It



Figure 17.—Yarding noble fir during harvest.



Figure 18.—A U-cut Christmas tree farm.

is not uncommon for questions to arise later about how a particular truck was loaded, the tree tally, or what trees were on the truck.

If you have a U-cut operation, the harvest has different considerations. You need to consider such issues as parking, how trees will be cut, marking trees available for harvest, customer safety, insurance, pricing, and collecting payments. Many U-cut customers also expect an “experience” rather than just a product (Figure 18). They value extras such as hot beverages, candy canes, popcorn, music, restrooms, things for kids to do, and decorations and associated Christmas items for sale.

Experienced U-cut growers know that much or most of their profit can come from supplemental products and from repeat customers who have had a good family experience. Growers also know that some customers just want the freshest tree possible, and they will cut and load the selected tree for these customers. They also will have some trees already cut and displayed for the “fresh tree in a hurry” bunch. These trees also give new arrivals an idea of the range of tree species, sizes, and qualities to look for when they go into the field to find their own tree.

Field renovation

Once harvest is complete, you need to get the site ready to replant. If the soil is not compacted or in need of other treatment, some growers simply replant between the stumps for a couple of rotations. However, growers are finding that stumps can pass along some root diseases to planted trees. If you need to remove stumps, you might have to wait until the summer after harvest, when soils are drier. Mechanical equipment and contractors are available to remove or grind stumps, which often is a very specialized task.



Getting the work done

When should all this work be done? The calendars on this page and page 19 show some of the common annual tasks. Keep in mind that sites differ. Activities at your location should be timed by tree development and soil, weed, and pest

conditions, not by a calendar date. The calendar shows typical activities for coastal and low-snowfall areas. In inland and higher snowfall areas, the same activities are compressed into fewer months, and outdoor tasks usually are done later in spring and earlier in fall.

January	February	March
<ul style="list-style-type: none">▲ Catch up on reading▲ Remove cull trees (any time)▲ Assemble records for taxes▲ Repair equipment▲ Review past season and plan improvements	<ul style="list-style-type: none">▲ Tree planting and basal pruning▲ Continue equipment repair	<ul style="list-style-type: none">▲ Tree planting▲ Grass and weed control▲ Fertilize (if necessary)▲ Look for rust on true fir
April	May	June
<ul style="list-style-type: none">▲ Tree planting▲ Monitor for pests▲ Weed control (before budbreak)▲ Look for Swiss needle cast on Douglas-fir	<ul style="list-style-type: none">▲ Control grass (postemergence)▲ Spray for Swiss needle cast on Douglas-fir▲ Monitor and control aphids, adelgids, rusts	<ul style="list-style-type: none">▲ Monitor and control pests▲ Shear pine▲ Early-season culturing on true firs▲ Canada thistle control

July

- ▲ Shear concolor fir, grand fir, Douglas-fir, noble fir
- ▲ Monitor pests
- ▲ Spray fern

August

- ▲ Continue shearing
- ▲ Finish top cutting
- ▲ Prepare fields for next year's planting
- ▲ Begin showing trees to buyers

September

- ▲ Monitor rust on true fir
- ▲ Take foliage samples for nutrient analysis
- ▲ Broadleaf weed control (after tree buds are dormant)
- ▲ Seed collection (if specific sources are desired)
- ▲ Prepare for harvest: tag, grade, check equipment
- ▲ Control erosion

October

- ▲ Contract to grow seedlings at nurseries
- ▲ Continue to get ready for harvest
- ▲ Look for interior needle blight on true fir
- ▲ Recheck labor and shipping arrangements

November

- ▲ Harvest

December

- ▲ Harvest
- ▲ Tax records
- ▲ U-cut sales
- ▲ Repair roads and ditches

Ongoing

- ▲ Collect seed or buy seed or seedlings
- ▲ Record keeping
- ▲ Contract to grow seedlings
- ▲ Marketing
- ▲ Update skills and knowledge

Timing and time requirements

When growing Christmas trees, many tasks must be done *before* problems develop. For example, Swiss needle cast spraying prevents the disease from developing. You cannot wait until July and decide to spray then because needles are infected.

Many insect and disease control treatments require early monitoring to determine what to do. The success of many herbicide treatments relies on assessing the stage of growth of both weeds and trees and clearly understanding the herbicides' mode of action. Shearing timing depends on the weather, how rapidly buds harden, and on the type of shearing you wish to do. How much time will all this take?

It depends. Table 3 provides some rough estimates.

Contracting considerations Few growers can or want to do everything themselves. For the rest, contractors are indispensable. You can hire a contractor to perform specific tasks or to manage the entire operation. Before you hire anyone for any job, however, be sure you've covered the following bases.

- Quality of work and references from other growers—check on timely start and completion dates and guarantees of quality or results. Be wary of contractors requesting prepayment for jobs and of situations where it is difficult to determine by whom and how work will be completed.

Table 3.— Estimated time needed for Christmas tree production tasks.

Activity	Method	Time required
Weed and grass control —broadcast	Backpack	5 acres/day
	Tractor	20+ acres/day
	Helicopter	100 acres/hour
Disease and insect control —broadcast	Backpack	2–3 acres/day
	Tractor	10+ acres/day
	Helicopter	50+ acres/hour
Shearing	Knife	Young trees: 500+/day Mature trees: 300+/day
Tree planting	Shovel	300+ trees/day
	Auger	400 trees/day
	Machine	6,000+ trees/day
Harvesting	Tagging	1,000 trees/day/person
	Cutting	800 trees/day/person
	Hauling	200 trees/day/person
	Baling	600 trees/day—3 people
	Loading	3 hours/semi-truck—4 people

- Insurance coverage—especially when contractors will be applying pesticides, shearing, and using power saws, you need to make sure that the selected contractor has current worker compensation insurance and liability coverage. Also review your own insurance coverage (see page 35).
- Be sure *you* know what you want from your contractor(s) and what a good job looks like. It's best to have a written contract, and always **stay closely involved** in the day-to-day operation.
- Check that the contractor has appropriate licensing for your state.

Popular species in the region



This section summarizes characteristics of the most commonly grown Christmas tree species in the Pacific Northwest. The list is not exhaustive, but it covers the bulk of species grown. The information can help you evaluate which of these species

might be best for your situation. Carefully assess your growing site and soil conditions, marketing strategy, and economic information before ordering trees. Once your trees are planted, you have them for at least the next 5 to 12 years!

Table 4.—Summary of common Pacific Northwest Christmas tree characteristics.

Species	Commonly grown?	Years to harvest	Preferred sites	Preferred soil conditions	Significant pest problems	Marketability and relative tree value
Colorado blue spruce	No	6 to 10	Valley to uplands	Poorly to well drained	Severe	Low
Concolor fir	Westside, no; eastside, yes	6 to 9	Valley to uplands	Well drained	Eastside, moderate; westside, severe	Moderate to high
Douglas-fir	Westside, yes; eastside, no	5 to 7	Valley to uplands	Moderately to well drained	Moderate	Moderate
Fraser fir	Westside, no; eastside, yes	6 to 9	Valley to uplands	Poorly to well drained	High	High
Grand fir	Yes	6 to 10	Valley to uplands	Moderately to well drained	Moderate	Moderate
Noble fir	Westside, yes; eastside, no	6 to 9	Uplands	Well drained	High	High
Nordmann fir	No	8 to 10	Valley to uplands	Moderately to well drained	Low	High
Scots pine	Westside, no; eastside, yes	5 to 7	Valley to uplands	Poorly to well drained	Moderate	Low
Shasta fir	No	7 to 10	Uplands	Well drained	Severe	Moderate
Turkish fir	No	7 to 10	Valley to uplands	Moderately to well drained	Low	High
Western white pine	No	6 to 8	Valley to uplands	Moderately to well drained	Low	Low

Colorado blue spruce

Scientific name *Picea pungens*

Varieties and seed sources to know

- Kaibab National Forest
- Look for sources that have higher percentage of blue progeny; generally, 35 to 40 percent true blue from open-pollinated sources

Preferred sites and soils

- Performs well on a variety of soils
- Any valley or upland site in western Oregon and Washington to 1,500-foot elevation or higher
- Eastside valley or upland sites to 4,000-foot elevation receiving 18 inches or more of annual precipitation

Expected rotation length 6 to 8 years (westside) or 8 to 10 years (eastside)

Relative value at harvest Low

What growers like about this species

- Good species for U-cut market niche
- Can be marketed as “balled and burlapped” landscape ornamental, too



Problems to watch out for

- Very poor keepability; drops needles first of all species
- Severe insect pest problems from tip weevil and mites must be controlled
- Rhizosphaera and Sirococus blight are problems
- Spruce needle miner a problem in inland Northwest plantations
- Cooley spruce gall adelgid a serious pest wherever Douglas-fir are nearby
- Sharp needles make handling difficult
- More susceptible to nutrition problems than other conifers
- Responds poorly to shearing; best shaped using hand shears

Concolor fir

Scientific name *Abies concolor*

Varieties and seed sources to know

- Santa Fe and Rio Grande National Forests

Preferred sites and soils

- A poor choice in western Oregon and Washington
- On eastside sites, well-drained soils receiving 16 inches or more of annual precipitation
- Good cold air drainage to avoid frost damage

Expected rotation length 6 to 9 years

Relative value at harvest Moderate to high

What growers like about this species

- Beautiful long, soft, silver-green foliage
- Can be dug and sold as landscape tree
- Excellent U-cut tree east of the Cascades
- Excellent keepability after harvest
- More adaptable to drier sites than most other fir species



Problems to watch out for

- Serious canker disease problems make this species difficult to grow on most sites in western Oregon and Washington
- Breaks dormancy in early spring and therefore very susceptible to spring frost damage

Douglas-fir

Scientific name *Pseudotsuga menziesii*

Varieties and seed sources to know

- Coastal seed sources (west of Cascades) best for westside plantings to reduce disease infection
- Selected improved sources available from private and association seed orchards

Preferred sites and soils

- Well-drained to moderately well drained soils
- Valley floor to 2,000-foot elevations in coastal, Willamette Valley, and Cascade locations
- Seldom grown east of Cascades

Expected rotation length 5 to 7 years

Relative value at harvest Moderate

What growers like about this species

- Easy tree to grow
- Widely grown and culturing well understood
- Seedlings plentiful
- Relatively few pests
- Well-established markets



Problems to watch out for

- Market for this species slowly shrinking
- Keepability problems when shipped to markets that are notably colder or warmer than the tree's growing site
- Must control Swiss needle cast for best quality trees

Fraser fir

Scientific name *Abies fraserii*

Varieties and seed sources to know

- North Carolina sources; best known are Roan Mountain and Rogers Mountain

Preferred sites and soils

- Prefers summer moisture; consider irrigation to improve tree quality
- Prefers soil pH that's closer to 6.0 than is common in the Pacific Northwest
- Any site from valley locations to 1,500-foot elevation or higher in western Oregon and Washington
- Eastside sites to 3,500 feet; annual precipitation of 32 inches or more, or irrigation

Expected rotation length 6 to 9 years

Relative value at harvest High

What growers like about this species

- Market substitute for noble fir in some areas
- Good keepability after harvest



Problems to watch out for

- Serious insect pest problems with adelgids and spider mites must be controlled
- Deer damage can be severe
- Best growth with supplemental summer irrigation on sites lacking summer rainfall
- Might have early cone set, which can be unsightly
- Branch–trunk junction is weak and susceptible to breakage under heavy snow loads and during freezing

Grand fir

Scientific name *Abies grandis*

Varieties and seed sources to know

- Clearwater, Idaho drainage is preferred source

Preferred sites and soils

- Performs best on moderately to well-drained soils
- Grows well on a wide range of sites in Oregon and Washington
- On eastside sites, plant on moderately well-drained, north- and east-facing slopes receiving about 28 inches or more precipitation annually; irrigate on drier sites

Expected rotation length 6 to 8 years (westside) or 8 to 10 years (eastside)

Relative value at harvest Moderate

What growers like about this species

- Glossy and very fragrant foliage
- Deer don't like it
- Relatively easy to grow and culture
- Good species for U-cut market
- Excellent table-top species, too



Problems to watch out for

- Significant pest problems include aphids and needle necrosis
- Keepability is poor without water. Extra care needed to protect trees on lots in hot- and cold-weather markets

Noble fir

Scientific name *Abies procera*

Varieties and seed sources to know

- Siletz River (OR) drainage and Mount St. Helens provenances traditionally used
- Growers often use own collections
- Improved sources available from Pacific Northwest Christmas Tree Association seed orchards

Preferred sites and soils

- Performs best on deep, well-drained soils
- Ideal sites are east and north slopes above 1,000-foot elevation in western Oregon and Washington
- Seldom grown east of Cascades due to frequent winter injury

Expected rotation length 6 to 9 years

Relative value at harvest High

What growers like about this species

- High market value
- Best keepability of any species; ships easily to markets in other climates
- Market demand increasing
- Excellent table-top species



Problems to watch out for

- Tree has wide genetic variability
- More challenging to grow
- Significant pest problems include root disease, aphids, and needle blights
- Current-season needle necrosis problems on some valley sites

Nordmann fir

Scientific name *Abies nordmanniana*

Varieties and seed sources to know

- Ambrolauri and Borshomi are popular yet slow-growing sources of seed located in the Caucasus Mountains in southern Russia, near the Caspian Sea
- Field testing is in process to evaluate performance

Preferred sites and soils

- Performs well on a variety of moderately to well-drained soils
- Any valley or upland site in western Oregon and Washington to 1,500-foot elevation or higher
- Eastside sites not well adapted

Expected rotation length 8 to 10 years

Relative value at harvest High

What growers like about this species

- Good species for U-cut market niche
- True fir that will grow on drier and wetter sites not suitable for grands or nobles
- Few pest problems



Problems to watch out for

- Slow-growing species during establishment
- High variability among seed sources
- Current shortage of seedlings
- Little experience growing this species in the Pacific Northwest
- Highly susceptible to frost damage in northern Idaho trials
- Deer damage can be severe
- Tends to grow “wide”

Scots pine

Scientific name *Pinus sylvestris*

Varieties and seed sources to know

- Guadarrama, Spain is preferred source to reduce winter needle yellowing
- French Highlands source has better blue-green foliage color

Preferred sites and soils

- Performs well on a wide variety of soil types from very wet to dry
- Any site from valley locations to 3,000-foot elevations on westside
- Avoid frost-prone locations
- Requires 16 inches or more of annual precipitation on eastside sites

Expected rotation length 5 to 7 years

Relative value at harvest Low

What growers like about this species

- Can be grown on the most poorly drained soils where no other tree will grow
- Can be cultured for a table top
- Ships well into cold and warm climates
- Can be dug and sold as a landscape tree



Problems to watch out for

- Major disease problems in western Oregon and Washington with needle cast and shoot moth; western gall rust is a problem in Idaho
- Limited and declining markets



Shasta fir

Scientific name *Abies magnifica* var. *shastensis*

Varieties and seed sources to know

- Shasta is a variety of California red fir; its native range is southern Oregon and northern California

Preferred sites and soils

- Performs best on well-drained soils
- Upland site locations to 2,500-foot elevation and higher in western Oregon and Washington
- Not grown east of the Cascades due to winter injury problems

Expected rotation length 7 to 10 years

Relative value at harvest Moderate

What growers like about this species

- Distinct whorls of limbs give layered, narrow look



Problems to watch out for

- Prone to foliage diseases and root canker diseases on wetter western Oregon and Washington sites; monitor closely for pest problems
- Can have needle loss problems after harvest

Turkish fir

Scientific name *Abies bornmulleriana*

Varieties and seed sources to know

- Several sources from northern Turkey near the Caspian Sea
- Little field testing done in Oregon and Washington to evaluate seed source performance
- One private seed orchard

Preferred sites and soils

- Performs well on a variety of moderately to well-drained soils
- Valley or upland sites in western Oregon and Washington to 1,500-foot elevation or higher
- Eastside sites not well adapted

Expected rotation length 7 to 10 years

Relative value at harvest High

What growers like about this species

- Faster growth than Nordmann
- Ability to grow on drier sites than grands or nobles



Problems to watch out for

- Keepability is more variable than noble fir's
- Concerns about frost damage in frost-prone areas; 43 percent of trees in northern Idaho trials had frost damage
- Little experience growing this species
- Grows slowly the first few years after planting
- Deer can be a problem

Western white pine

Scientific name *Pinus monticola*

Varieties and seed sources to know

- Blister-rust-resistant sources, if available

Preferred sites and soils

- Performs best on moderately to well-drained soils
- Any site from valley locations to 2,000-foot elevation or higher in western Oregon and Washington
- Eastside sites receiving 30 inches or more of annual precipitation; irrigate on drier sites

Expected rotation length 6 to 8 years

Relative value at harvest Low

What growers like about this species

- Has soft, blue-green foliage
- A good tree for the “something different” market niche



Problems to watch out for

- Blister rust disease can be a problem; eliminate any currant or gooseberry species in area
- Limited markets
- Flexible limbs do not hold ornaments well
- Interior needles shed in dry years

Laws and regulations



Potential Christmas tree growers need to know about a wide variety of laws, rules, and regulations before deciding to enter this business. Below are summaries of important information; details can be obtained from sources listed on page 40. These rules change, so contact the appropriate agency or department for up-to-date developments.

Zoning and property taxes

Oregon Christmas tree land typically is classed as agricultural land for property tax purposes. To qualify for the agricultural property tax deferral, you must show at least the following annual income from agricultural operations.

6 acres or less	\$650
6.1 to 29.9 acres	\$100 per acre
30 acres or more	\$3,000

Get specific information from the assessor in the county where your potential Christmas tree site is located. Look in the blue pages of your phone book under “County Government.”

Washington Christmas-tree-growing property typically is designated and taxed under Open Space–Agriculture zoning regulations. Contact your county assessor for details.

Idaho The tax situation for Christmas tree farms is somewhat complicated. Property taxes on the land are assessed yearly. Income taxes are levied on the sale of harvested trees. In at least some counties, you also must pay personal property taxes on all your hand tools, office equipment, vehicles, and machinery. Contact your county assessor to determine how your property and operation would be taxed.

Christmas tree licensing and inspections

Oregon All Christmas tree growers selling more than \$1,000 worth of trees in a year must be licensed. Oregon’s licensing program began in the mid-1980s when growers were concerned about outbreaks of the gypsy moth in the state. Licensing is a way to provide for independent pest assessment for trees grown in and shipped from Oregon and to prevent the spread and introduction of pests.

Apply to the Oregon Department of Agriculture (ODA) Plant Division for licensing. The licensing fee is based on the number of acres in Christmas tree production. The fee structure is a basic charge with additional per-acre fees.

Licensed growers receive field assistance from ODA Christmas tree inspectors who evaluate plantations for pest activity. Inspectors also can provide information about special pest quarantine requirements of states and countries where the grower plans to ship trees.

Washington Inspection services, if needed, are available for a fee through the Washington Department of Agriculture, Plant Industry Division. The state does not have a Christmas tree licensing program.

Idaho All commercial Christmas tree growers in the state must obtain or renew nursery licenses annually. The law applies to anyone who propagates, grows, sells, deals in, or imports trees and who advertises in any way or who has annual sales of \$500 or more. The license fee is \$75 annually, regardless of farm size or sales. In addition to holding nursery licenses, growers must have their farms and

trees inspected to identify pest and disease problems. Licensing and inspections are by the Idaho Department of Agriculture (IDA). Information on quarantines also comes from the IDA.

Pesticide safety requirements

Christmas tree growers frequently have the option to use pesticides to control weeds, diseases, and insects in their plantations. State agriculture departments classify pesticides as either general use or restricted use. To buy restricted-use products, a person must have a pesticide applicator license or other appropriate license. Each state and even some counties have specific interpretations governing pesticide use.

A series of Federal Worker Protection Standards govern farm employees' re-entry into property treated with pesticides. Employers also might be required to give employee training, post re-entry warning notices, and provide access to medical care for employees.



Figure 19.—Pesticide application to prevent grass growth.

Oregon The Oregon Department of Agriculture regulates pesticide use in the state. You must pass a written examination to get a private applicator license to apply restricted-use pesticides. Exam material includes basic safety in using and applying pesticides—information that any grower applying any pesticide would benefit from knowing. The license is for 5 years, during which you can attend continuing credit classes in lieu of retaking the exam

when the license expires. Oregon also has pesticide reporting and record keeping requirements for all Christmas tree pesticide applications.

Any grower applying pesticides for hire, or on property other than his or her own, must have a commercial pesticide applicator's license when applying any general-use or restricted-use pesticide.

Washington Washington's pesticide license regulations are similar to those in Oregon, yet an Applicator's License (or similar license) might be required in more situations. The Washington State Department of Agriculture (WSDA) is the lead agency. Licensed applicators must keep records of all applications according to WSDA standards. Nonlicensed applicators applying pesticide to more than 1 acre per year also must keep records of all applications.

Idaho Idaho pesticide regulations generally are similar to those in Oregon. They are administered by the Idaho Department of Agriculture (IDA). If you apply agricultural chemicals on your own farm, you must hold a private applicator's license. Several types of licenses are available; they cost \$10 to \$30 depending on the type. You earn a license by submitting an application and passing a closed-book exam. The IDA offers study materials and classes.

If you apply agricultural chemicals on another person's property, or supply technical advice or recommendations about agricultural chemicals, you must have a professional applicator's license from the IDA. Many types of professional licenses are available. You earn them by submitting an application, passing a closed-book exam, providing proof of financial responsibility, and paying a \$120 fee.

Obtaining a license is only the beginning. In Idaho, licenses are issued for 2 years. To recertify, you must either take the exam again or attend training classes, workshops, or seminars approved by the IDA. Private applicators require 6 hours and professional applicators 15 hours of training each 2 years to recertify.

Labor laws and hiring workers

Any time you hire labor, you must deal with a host of rules and regulations that vary depending on the type of employment. Small-scale growers, and those who don't want to deal with hiring workers directly, often find that hiring a farm contractor is the simplest solution. Or, growers can hire consultants and contractors to perform specific tasks.

Farm labor contractors in Oregon and Washington must be licensed and bonded by the state. Idaho does not license or bond farm labor contractors but does require that they be licensed through the U.S. Department of Labor. It is the contractor's responsibility to follow all pertinent labor laws and regulations. These include regulations about wages, work schedules and hours, worker protection and safety, and housing (when provided).

Names of licensed farm labor contractors are available from your state's department of labor.

Other sources for locating contractors are farm newspapers and periodicals, publications from growers' associations, other growers, Extension offices, suppliers of farm products, and telephone directories.

Insurance

Adequate insurance is essential for any business enterprise. It's especially important when hiring workers or allowing the public on your property for any reason. U-cut operations are particularly vulnerable to liability claims. There's always the potential for automobile accidents, personal injury from using saws or lifting and carrying, and a variety of other claims. Be sure to thoroughly review your coverage with your insurance agent before you begin operations; consider umbrella policies to protect all your assets in the event of a large claim.



Costs, returns, and income taxes

Determining how much money growers will make (or lose) in the course of a rotation is difficult. Business newcomers often underestimate expenses and overestimate returns. Prospective Christmas tree growers are no exception.

Estimating returns from Christmas trees is affected by at least three factors:

- Your ability to predict future prices
- Your inability to guess future consumer preferences
- Your ability to produce high-quality trees in a cost-efficient manner

Nevertheless there is some value in discussing the patterns of timing of costs during a tree rotation. Cost estimates vary widely depending on how growers account for their own time, interest expense, and land cost, and how much work is contracted.

In general, Christmas tree costs have two high points: one during establishment (site preparation, tree purchase, and planting) and one at harvest. The largest cost categories are harvesting, culturing, and weed and pest control. Some costs during the rotation, such as cultural costs, increase as the trees increase

in size. Other costs, such as herbicide applications or other per-acre costs, tend to remain rather fixed during a rotation.

Income, in contrast, comes at the tail end of the rotation, at harvest.

Income taxes

Federal Rules governing tax treatment of Christmas tree income and expenses often follow rules governing timber operations, depending on how sales are set up and how old the trees are when cut. Generally, income is taxed at the long-term capital gains rate. Some expenses, such as shearing and spraying, are deductible in the year they are paid. Other expenses, such as planting, are capitalized. Agriculture Handbook 718, "Forest Landowner's Guide to the Federal Income Tax," gives a few examples using Christmas trees (see page 38).

Consider filing estimated federal income tax payments quarterly if you expect your income to rise sharply in harvest years. Consult a tax adviser on issues such as self-employment taxes.

State Most state rules mirror the federal rules.

Summary



Prospective growers are encouraged to explore a wide array of information sources. We have attempted to provide a state-of-the-art summary, yet practices and rules change. It's a good idea to visit with experienced growers, visit Christmas-tree-related Web sites, take part in grower associations, and read pertinent publications.

We have emphasized some of the pitfalls that trap many new growers. We do so not to discourage but to provide a reality check. Growing Christmas trees can be a rewarding enterprise, given good planning and a thorough knowledge of the basics.



For further information

Publications

For ordering information, see page 39.

- Bondi, M.C., R.A. Fletcher, J. Hart, D. Horneck, C. Landgren, and S. Webster. 2000. *Christmas Trees Fertilizer Guide: Oregon and Washington* FG 73. Corvallis: Oregon State University Extension Service. 5 pp. Available only online (<http://eesc.oregonstate.edu/agcomwebfile/edmat/FG73.pdf>) and from OSU Extension county offices. No charge.
- Bubl, C. and G. Stephenson. 2003. *What Can I Do with My Small Farm?* EC 1529. Corvallis: Oregon State University Extension Service. 16 pp. \$2.50
- Chastagner, G.A., R. Byther, A. Antonelli, J. DeAngelis, and C. Landgren. 1997. *Christmas Tree Diseases, Insects, and Disorders in the Pacific Northwest: Identification and Management*, MISC 186. Pullman: Washington State University Cooperative Extension. 156 pp., 130 color illus. \$29.00
- Duddles, R.E. and C.G. Landgren. 1999. *Selecting and Buying Quality Seedlings*, EC 1196. Corvallis: Oregon State University Extension Service. 12 pp. \$2.00
- Emmingham, W.H., B.D. Cleary, and D.R. DeYoe. 2002. *Seedling Care and Handling*, EC 1095. Corvallis: Oregon State University Extension Service. 4 pp. \$1.00
- Haney, H.L., W.L. Hoover, W.C. Siegel, and J.L. Green. 2001. *Forest Landowner's Guide to the Federal Income Tax* (revised), Agriculture Handbook 718. USDA Forest Service. \$20.00
- Hart, J. 2002. *A List of Analytical Laboratories Serving Oregon*, EM 8677. Corvallis: Oregon State University Extension Service. 4 pp. \$1.00
- Hart, J. 1998. *Fertilizer and Lime Materials Fertilizer Guide*, FG 52. Corvallis: Oregon State University Extension Service. 6 pp. Available only online (<http://eesc.oregonstate.edu/agcomwebfile/edmat/html/fg/fg52/fg52.html>) and from OSU Extension county offices. No charge.
- Landgren, C.G. and B.S. Douglass. 1993. *Developing High Quality True Fir Christmas Trees*, PNW 226. Corvallis: Oregon State University Extension Service, Washington State University Cooperative Extension, and University of Idaho Cooperative Extension System. 24 pp. \$1.50
- Mukatis, W.A., N.E. Elwood, P.W. Adams, and C.F. Sutherland. 1998. *Contracts for Woodland Owners and Christmas Tree Growers*, EC 1192. Corvallis: Oregon State University Extension Service. 20 pp. \$2.00
- Oester, P.T. 2000. *Enhancing Reforestation Success in the Inland Northwest*, PNW 520. Corvallis: Oregon State University Extension Service, Washington State University Cooperative Extension, and University of Idaho Cooperative Extension System. 12 pp. \$2.00
- PNW Weed Management Handbook (WEED), PNW Insect Management Handbook (INSECT), and PNW Plant Disease Management Handbook (PLANT). Revised annually. Corvallis: Oregon State University Extension Service, Washington State University Cooperative Extension, and

University of Idaho Cooperative Extension System. Each handbook lists currently registered treatments for pests on Christmas trees. \$35.00 each. Available online at:

- *Insects*: <http://pnwpest.org/pnw/insects>
- *Plant Disease*: <http://plant-disease.ippc.orst.edu/index.cfm>
- *Weeds*: <http://weeds.ippc.orst.edu/pnw/weeds>

Proebsting, W.M. and C.G. Landgren. 1993. *Developing Sheared Douglas-fir Christmas Trees*, PNW 227. Corvallis: Oregon State University Extension Service, Washington State University Cooperative Extension, and University of Idaho Cooperative Extension System. 24 pp. \$1.50

Robotham, M. and J. Hart. 2003. *Soil Sampling for Home Gardens and Small Acreages*, EC 628. Corvallis: Oregon State University Extension Service. 2 pp. \$1.00

William, R.D. and K.N. Brown. 1995. *Managing Weeds and Vegetation in Christmas Trees*, PNW 219. Corvallis: Oregon State University Extension Service, Washington State University Cooperative Extension, and University of Idaho Cooperative Extension System. 8 pp. \$1.00

Videotapes

Landgren, C.G. and L. Ketchum. 1999. *Calibrating and Using a Backpack Sprayer*, VTP 17. Corvallis: Oregon State University Extension Service. 16 min. (VHS) \$30.00. Comes with *Calibrating and Using a Backpack Sprayer*, PNW 320. 1996. Corvallis: Oregon State University Extension Service, Washington State University Cooperative Extension, and University of Idaho Cooperative Extension System. 20 pp. \$1.50 (publication at no charge when ordering video).

Landgren, C.G. and L. Ketchum. 2002. *Shearing and Culturing Christmas Trees*, VTP 5. Corvallis: Oregon State University Extension Service. 68 min. (VHS) \$33.00

Ordering information

Order OSU publications and videos from:
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Web info.ag.uidaho.edu/Catalog/catalog.htm

Order Agriculture Handbook 718 from:
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Portland, OR 97201-5801
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Fax 503-225-0563
e-mail portlandbks@gpo.gov

Organizations, contacts, and Web sites

Associations

The Pacific Northwest Christmas Tree Association provides a wide range of services to members. *The Christmas Tree Lookout*, published four times a year, is an excellent source of research results and management ideas. Contact the PNWCTA at P.O. Box 3366, Salem, OR 97302 or via the Web at <http://nwtrees.com>

The National Christmas Tree Association
<http://www.realchristmastrees.org>

Inland Empire Christmas Tree Association
P.O. Box 328, Harrison, ID 83833-0328

Cooperative Extension Service offices

County offices have a variety of publications useful to Christmas tree growers. In addition, Extension agents with Christmas tree expertise are in offices that serve important Christmas-tree-producing regions. Look in the government section of your phone book under "USDA, Extension Service" or under county offices. Web sites include:

Oregon <http://extension.oregonstate.edu/>
Idaho <http://www.uidaho.edu/ag/extension/>
Washington <http://pubs.wsu.edu> and
<http://foodfarm.wsu.edu/ChristmasTrees.htm>

Federal government agencies

The USDA Natural Resources Conservation Service can provide information about soils, mapping, and conservation programs. Look in your telephone book's government pages under "U.S. Government offices."

Private companies

Consultants are available in some areas to assist you with plantation problems, expert testimony, and marketing. Contact your local Extension Service office to find out who offers Christmas tree consulting in your area.

Farm service companies can be excellent sources for information about current labels and uses for pesticides and fertilizers. They also might be able to help you locate needed equipment.

State departments of agriculture

The Oregon Department of Agriculture has a nursery inspection program for Oregon Christmas tree growers. Inspectors are available to visit Christmas tree fields and diagnose insect and disease problems. Web site <http://www.oda.state.or.us>

The Idaho Department of Agriculture also provides inspections. Web site <http://www.agri.state.id.us>

The Washington Department of Agriculture
Web site <http://agr.wa.gov/>

Additional information sources

North Carolina Cooperative Extension Service Educational Materials Web site <http://www.ces.ncsu.edu/nreos/forest/pubsandinfo.htm>

Michigan State University <http://www.msue.msu.edu/aoe/xmas/>



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