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## INTRODUCTION

The major sources of Christmas trees are still private timber lands and national forests. With the increasing costs of trees from natural stands, involving management practices, transportation, handling, storage, and retailing, it has become evident that Christmas trees can be grown in the Central Coast area as a farm crop in competition with other sources of trees, particularly if the trees are marketed on a "choose and cut" basis. Christmas trees have proved profitable enough to compete with other crops on some agricultural land, mainly dryland crops. There is also an increasing demand for live trees for landscape uses.

The purpose of this publication is to present the information developed to date on growing Christmas trees either as a full-time project or as a means of supplemental income.

## LAND CONSIDERATIONS

Some important questions to consider when choosing a site are soil type and depth, slope, weather, accessibility, and number of acres needed.

Soils. Sandy loams or loams are probably best, but the chief considerations should be depth and good drainage. A minimum of two feet of soil is necessary. Above all, avoid areas of poor drainage. Indicators of poor drainage are standing water during the raining periods and the presence of water-loving plants such as wiregrass, sedge, buttercups, and curly dock. Consult soil surveys to find out about soil depth, water holding capacity, and permeability of surface and subsurface soils. Take a shovel along when evaluating a prospective site. Rocky areas are not suitable to mechanical operations and will increase labor costs. Highly productive agricultural soils are expensive to purchase and are usually better suited for more intensively managed crops. Suitable soils are previously forested areas, pasture land, utility company easements, or marginal agricultural lands such as fields farmed for dryland hay production.

Slope. Level to gently sloping ground is preferred. Slopes steeper than 10% may have erosion problems, are difficult to work with equipment, and are not conducive to "choose and cut" harvest. For dryland production, north- or east-facing exposures are probably best, while south- or west-facing slopes tend to be hot and dry and have increased tree mortality.

Weather. Avoid frost pockets. If planting close to the ocean, check surrounding trees for indications of wind burn. As most trees in this area are grown without irrigation, sufficient winter rainfall is necessary for survival. Exact rainfall minimums required are hard to pin down because they are related to soil types and climatic factors such as fog and summer temperatures. At a site near Sunnyvale, second-year growth was excellent with only five inches of rain and no summer irrigation. It would seem for most areas, however, that 12 to 20 inches of rain should be considered minimum.

Accessibility. If you are to have a successful "choose and cut" operation, customers must be able to get to your farm during Christmas season. As this

can be a wet period, all-weather roads are a must. Geographical location in relation to the prospective population market should also be considered.

Size. When considering how many acres to plant, don't forget access roads, parking areas, checkout stands, and alleys for equipment such as sprayers. If you buy ten acres, you can't plant ten acres of trees!! Farms in this area range from 1/2 acre to over 200 acres. Approximately 20 to 40 acres seems to be a manageable unit.

### VARIETY CONSIDERATIONS

A number of conifers have been tried in the Central Coast and Santa Cruz County areas. Of them, Monterey pine, Douglas-fir, and Scotch pine have proved best adapted. Bishop pine, Austrian pine, and White fir have produced good trees on some farms. Seedlings of high-elevation origin have not proved satisfactory at the lower elevations of the Monterey Bay area.

Monterey Pine. Monterey pine has the most rapid growth and generally must be pruned at least twice each year to obtain good shape. The tree will generally reach market size in three to five years after field planting. Monterey pine is very susceptible to Western gall rust. This is particularly true in areas where other Monterey pines are grown or the native Knob-cone pine occurs, as they are frequently a source of infection. Monterey pine is also subject to damage by spider mites or false spider mites, which cause a browning of needles in the summer and fall. Early control, before damage is apparent, is important to prevent needle discoloration at Christmas. Early-winter or late-fall rains may cause a surge of new growth near Christmas. These tender tips should be pruned before sale or they will wilt when the tree is cut.

Douglas-Fir. Douglas-fir is a traditional and very popular type of Christmas tree in this area. Once established, it grows rapidly and tends to have long internodes unless controlled by proper pruning. This tree requires about five to seven years from field planting to a market size of six feet. Spruce gall aphid (Adelgids), stem and twig borers, and mites have caused serious damage, but can be controlled with spray chemicals.

Scotch Pine. Scotch pine has a moderately long, stiff, sharp needle and is gray-green in color. It is raised commonly in Eastern tree farms, and public acceptance has been good. It grows at a rate similar to Douglas-fir and generally requires pruning. Many early plantings of Scotch pine had a tendency to develop yellow foliage at Christmas. This has been controlled by careful selection of seed sources that do not have this characteristic. Insect and disease problems have not been serious to date. Gophers seem to prefer Scotch pine to other conifers.

Other Varieties. White fir, Bishop pine, shore pine, sugar pine, ponderosa pine, blue spruce, Sierra redwood, and several true firs have been included in some plantings in this area. None have proved as acceptable as the varieties discussed above, and the spruce and true firs are slow to develop a marketable tree. Arizona cypress has been planted and grows well in the Central Coast area, but the public does not generally accept it as a Christmas tree. Two pines that merit testing are P. brutea and P. eldarica.

a year in the seedbed and a year in the transplant bed, seedlings are classed "1-1." White fir and other true firs may need three years before field planting as either "2-1" or "1-2" seedlings.

## FIELD PLANTING

Soil Preparation. Soil preparation will depend on initial soil and vegetation conditions. The main objective is to eliminate competition from other vegetation and break up any hardpans that may exist. Brush, grass, and other weeds can completely choke out a new planting. Competing vegetation should be killed either mechanically or chemically before planting. The amount and cost of site preparation will vary widely, depending on the amount of vegetation and the terrain. Annual grass pastures may be plowed and disced once, whereas improved pastures of perennial grasses may have to be worked several times. If hardpans or subsurface clay layers exist, it may be necessary to rip the area before planting. Be sure to start land preparation far enough in advance of planting so that all necessary tasks can be accomplished.

Planting Design. Because the object is to sell trees, you will wish to plant as many trees per acre as practicable. When deciding on a design, consider how you will control weeds and space for the customers to walk. If you control weeds mechanically by mowing or disking, more space is required per tree than when weeds are chemically treated. When trees are planted four feet apart in rows and four feet between rows, 2,722 trees can be planted per acre. In a six-foot by six-foot planting the number of trees is reduced to 1,210. Some growers do all spraying by hand with backpack sprayers so no equipment alleys are required. However, if equipment is to be used, take this into consideration when designing your layout.

When to Plant. It is best to plant when trees are dormant. Because of relatively mild weather conditions in this area, the dormant period can be short. January, February and March have proved the best months for field planting. Seedlings purchased from the State Division of Forestry are not available until after December 15th.

How to Plant. Trees may be planted either mechanically or by hand. Mechanical planting is much faster and more economical than planting by hand. Special tree planters are available, and planters used for truck crops can be modified to plant trees. Brussels sprout planters have been modified and successfully used in this area. It is important that the tractor selected have adequate power and be geared low enough for tree planting. A hydraulic three-point hitch is needed.

Hand planting is frequently used where size of acreage or slope excludes the use of a tractor and mechanical planter. A tree planting bar, balling shovel, regular shovel, or transplanting hoe can be used to hand-plant trees. Soil should be firmed about the roots of the seedling. A planting hole shaped like an hour glass should be avoided when using a planting bar or balling shovel. In well cultivated soil and moderate slopes, a seasoned planter can hand-plant about 80 seedlings per hour. Power augers have also been used, but planting costs are much higher than when other hand-planting techniques are used.

For detailed instructions on planting techniques, refer to "Planting California Forest Lands," publication number 2925.

## SOURCE OF SEEDLINGS

Most growers rely on the State Division of Forestry or private nurseries as sources of seedlings for their plantations. Bare-root seedlings of most varieties can be purchased for 5 to 6 cents each from the State Forest Nursery when purchased in quantities of at least a thousand. Potted stock costs about ten times as much in similar quantity.

The problems of soil, seedbed preparation, seed collection and selection, stratification, soil fumigation, irrigation, insect and disease control, and weed control have led most growers to rely on the public and private nurseries for planting stock. These nurseries have the experience and equipment to handle these problems.

## TREE SIZE

Most plantings are done with small bare-rooted planting stock. Balled or potted trees are too expensive for most plantations. Planting stock is listed by Forest Nurseries as 1-0, 2-0, or 1-1. The first number shows years in seedbed; the second shows years in transplant bed.

1-0. Trees grown one year in nursery seedbed. Monterey pine seedlings are usually big enough for field planting at this age, if they have made good growth. Some site conditions may require bigger seedlings than 1-0.

2-0. Two-year-old trees grown two years in the nursery seedbed. Good for slow-growing trees like Douglas-fir and White fir.

## TRANSPLANT BED

A transplant bed is desirable for most "1-0" nursery stock except Monterey pine. A well drained, light, sandy loam at least two feet deep with water available is best for transplant bed use.

Layout. Seedlings can be placed in rows at intervals of  $1\frac{1}{2}$  inches. A distance of  $1\frac{1}{2}$  to 2 feet between rows is adequate to permit either hand or machine operations necessary in weeding, digging, and other care. The placing of strips of roofing paper between the rows tends to reduce the weed problem but increases the number of fibrous roots near the surface of the ground.

Pre-emergence weed killers should be used with caution on young plants; injury has occurred on some soils.

Planting. The seedlings can be placed in the transplant bed any time during the months of January to April. At no time should the roots of seedlings be allowed to dry out. A ditch with one vertical side makes transplanting easier than an open trench. Some growers have developed an implement that will provide such a trench.

Irrigation. Irrigation of the transplant bed should be often enough to keep the trees in good vigor. This will vary from intervals of two to three weeks in the spring to every week to ten days during the hot, dry summer months. Irrigation is reduced about September 1 to harden off the transplants. After

Monterey pine, the principal species planted in this area, is not suited to cold storage, so try to arrange a delivery date as close as possible to your planting date. If you are unable to plant right away because of wet weather or other factors, heel trees in for short storage. "Heeling in" means to plant trees in a slanted trench, located in the shade, until field planting is practical. Trees can be left in bundles as long as the roots are thoroughly packed in soil.

## PESTS

Pests of Christmas trees include animals, insects, diseases, and weeds.

Animals. Gophers, rabbits, mice, and sometimes deer can be critical problems unless kept under control or excluded. Gophers are controlled by the use of poisoned baits and trapping. A tractor-drawn mechanical gopher bait applicator can be used between rows if slope and spacing permit.

Deer and rabbits may have to be excluded by adequate fencing. Repellents have been effective but must be applied repeatedly as new growth develops. Bulletins are available at your Agricultural Extension office on "Rodent Control" and "Fences for Controlling Deer Damage." Cost of deer fencing varies but can run as high as \$2 to \$3 per foot. Douglas-fir is very prone to deer damage while Monterey pine is usually not touched.

Insects and Diseases. "Pest and Disease Control Guide for Christmas Trees," Leaflet 2994, has current recommendations for control of insects and diseases and is available from your Farm Advisor's office. It discusses red spider mites, adelgids, western gall rusts, needle rusts, and other pests common to this area. The key to disease and insect control is vigilance and good management. Vigorously growing trees on well drained soils are less prone to plant pests. Check your trees often so that if any problem does occur, you can be on top of it at an early stage.

Weeds. Weed control during the first two years of growth is crucial to plant survival, particularly under dryland conditions. Weeds steal moisture and nutrients from the soil; shade and suppress the seedlings' growth; and provide a habitat for field mice, rabbits, and gophers. Extent and methods of weed control may be dictated by the slope and erosion potential of the soil. Control measures include discing, rototilling, mowing, and use of herbicides.

Several pre-emergence herbicides are widely used and have proved effective for the first two to three years of growth. After that time the trees begin to shade out weeds. Timing of application for pre-emergence herbicides is critical. For information on rates, application methods, and particular herbicides to apply, call on your local Extension office.

Cultivating is acceptable, but the required wider spaces between rows cut down the number of trees per acre. Careful operation is necessary to avoid mechanical damage to trees.

Mowing is a desirable means of weed control where a low vegetative cover is desirable for erosion control.

## PRUNING

Douglas-fir, Monterey pine, and Scotch pine will need some pruning after they are established in the field. The object of pruning is to control growth and shape the tree to the desired conical taper.

Pruning of young trees is usually confined to leader control. Remove double leaders and remove the growing tip of a young seedling at 12 to 14 inches if a well formed whorl has not developed. Everyone has his own theory on how long to leave leaders, so it is probably best to check your neighbor's methods and form your own opinion. Whatever system you decide on, it is very important that you walk through the trees often during periods of rapid growth and prune leaders that begin to bolt. If this is not done, trees will have large spaces between whorls. The exposed trunk will take on a "leggy" appearance.

Side branches are pruned to give the tree a 50% to 60% taper. A 50% taper means the tree will be twice as high as it is wide at harvest time. A 7-foot tall tree will be 3.5 feet wide at the base with a 50% taper. When shearing, visualize a 7-foot high tree 3.5 feet wide at the base and cut back any side branches that protrude beyond this imaginary shape. Many growers make the mistake of using a shearing line from the present height of the tree to the base. This causes a narrow top and gives an over-sheared appearance to the tree. Too early shaping of conifers before they reach at least three feet in height tends to make them too compact at harvest.

Monterey pines can be pruned at any time of the year, but best results occur when the new flush of spring growth is 3/4 expanded. Douglas-firs should be pruned after the season's growth is completed and buds are formed. With Scotch, Austrian, and Bishop pines, the general practice is to head back the "candles" when the new needles are half the length of the old needles.

How often a tree should be pruned in any one year will depend on how fast it is growing.

The most common tool used for pruning is a machete or pruning knife, but hedge shears and hand shears are also used. Pruning and shaping is a major labor cost of plantation grown trees.

## MAINTAINING THE PLANTATION

What do you do for replacements when trees are cut? There are generally three practices followed.

Stump Culture. By cutting trees just above the bottom whorl of branches, you can leave limbs that may turn up and form new trees. As the branches turn upward, one is selected to form a new tree and the others are cut off. A tree can often be produced in a shorter time, but excessive pruning and shaping are sometimes required. Rather than hassle the customer to leave a lower whorl when cutting, some growers forget stump culture and resort to other reforestation methods.

Frequently, an adventitious bud develops on the stump that will give a straighter trunk than a "turn-up" branch. A strong shoot can be selected at the end of the first year and the old whorl removed after two years.



Interplanting. Planting young seedlings among older trees is not always satisfactory. Spacing of the original trees is a key factor. If the original planting was four feet by four feet or less, young seedlings would be unlikely to develop because of competition from the older trees. Interplants are often damaged inadvertently by customers.

Replanting Blocks. It is often best to plant and harvest trees in blocks. This makes replanting much easier. When a majority of the salable trees are sold from one area, remaining trees and stumps are removed, and the ground is worked and replanted. This is particularly a good practice if western gall rust is a problem and turn-up limbs are infected. The possibility of developing a salable tree, in this instance, is remote.

### ECONOMIC CONSIDERATIONS

The size of the operation may depend upon whether Christmas trees are to be a supplemental income crop or a full-time occupation. In either case, the plantation will have to be large enough to maintain a certain yield. Monterey pine requires a four- to five-year field rotation. Slower-grading species may take seven to ten years to reach market potential.

An economic unit will require approximately 30 to 40 acres in trees to sustain sales of 5,000 to 7,000 trees per year at maturity. This is based on a clear-cut and replant system. This allows for access roads within the plantation, but parking area and buildings would require additional land.

Sample cost studies are not available as representative Christmas tree plantations are non-existent in this area. Costs that should be considered are:

- \* Site preparation - varies with terrain, brush, etc.
- \* Taxes - varies with site and location
- \* Trees and planting cost
- \* Weed control
- \* Pest control - rodents, insects, etc.
- \* Shearing and other cultural practices
- \* Equipment - sprayer, saws, irrigation, etc.
- \* Marketing - advertising, receipt books, extra help, etc.
- \* Roads, parking area and sales facilities
- \* Netting and equipment
- \* Depreciation and interest on investment

General consensus is that it costs a minimum of \$500 per acre to bring a "choose and cut" operation into production.

### GENERAL OBSERVATIONS

1. There are eight main marketing days before Christmas each year. These are the four weekends before Christmas, when people can travel to a plantation and "choose and cut" their own trees. Only a small percentage of the sales can be expected on week days. Many operations open for business on Saturday after Thanksgiving.
2. Most people traveling any distance will arrive between 10 A.M. and 4 P.M.

3. At that time of the year, rainy days may prove a problem during at least one-fourth of the marketing time. This factor is as variable as the weather and may be serious.
4. Most people can be trusted with handsaws to go out into the field and "choose and cut" their own trees when provided with simple instructions such as prominent posters on how to cut. Trees less than seven feet may be cut too low for stump culture.
5. A set price per tree, including sales tax and netting, is more convenient when dealing with many people in a short time than trying to sell on a lineal foot basis. This also helps to get rid of large trees. Charging a flat price to six feet and additional charges for each lineal foot above that are frequently made, although this may slow the checkout procedure and discourage sales of taller trees.
6. Adequate roads, parking, and checkout facilities must be available to accommodate the people participating on these marketing days. One car can be expected for every tree sold. Each car will average about four people. Approximately 20% of the Christmas tree farm is needed for roads and parking.
7. Restroom facilities are necessary; portable facilities can be rented for the marketing period.
8. The "choose and cut" Christmas tree farm provides a convenient outlet for other types of natural decorations such as holly, greens, wreaths, mistletoe, and pinecones. It is best to sell such items in areas away from the checkout stands so as not to congest the checkout area. Additional parking may be required. A cleanup crew may be necessary if refreshments are sold.
9. Signs are needed in rural areas to direct people from the main arteries of travel. State and county ordinances prevent the adequate use of signs in many areas.
10. The novelty of the first Christmas tree farms in this area has led to considerable publicity, which must be replaced by advertising as tree farms become more common.
11. It is better to put up "sold out" signs than to overcut a plantation.
12. Tagging trees to reserve them before "choose and cut" marketing is not advised. Tags tend to disappear or end up on other trees. Tagging further increases the operator's marketing cost and requires two trips to the plantation by the customer. Higher prices are needed to offset costs.
13. Packaging machines using plastic netting facilitate handling and loading of trees.
14. The purchaser should be advised to keep the tree in water to reduce drying out, needle drop, and fire hazard.
15. Some growers provide fire proofing and flocking.
16. Too many farms serviced by one county road can cause inconvenience to the buying public and local residents due to traffic congestion on fair weather marketing weekends.

17. Any supplemental wholesale operation should be on a cash basis and well regulated to protect the grower's "choose and cut" operation.

Christmas tree growing can be profitable for the part-time and full-time operator. However, trees are not a "get rich quick" crop. A thorough analysis of soils, growing conditions, labor sources, accessibility, and market potential should be made before any trees are planted. A paramount consideration for the part-time operator is how much spare time you have and how much do you want to spend working your plantation? When all these questions are resolved, it's time to plant!

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