Guidelines for Growing and Marketing Christmas Trees In New Mexico

Prepared by Forestry Division, and Department of Horticulture (Mora Research Center), New Mexico State University

In cooperation with the United States Department of Agriculture, Forest Service
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Introduction

New Mexico landowners are becoming more interested in growing and marketing Christmas trees each year. They see opportunities for profitable investment, vigorous outdoor activity, aesthetics and conservation. Plus, more customers are brought to the market every year.

A profitable Christmas tree enterprise like any other business, requires considerable time and effort. The successful grower produces quality trees, and quality trees are the result of time spent applying proper management techniques. There are several steps involved:

1. Species selection
2. Plantation site selection
3. Site preparation and planting
4. Protection and culture
5. Harvesting and marketing
Industry Trends—Market Outlook for New Mexico

Like other thriving industries, the growing and marketing of Christmas trees is a dynamic process. Growers must be alert to apparent market trends in order that they may more effectively control the numbers, kinds, sizes, and quality of trees that he is growing, or the manner in which they are being marketed. Some changes are long-term in their development and hence, predictable. Others, being more sporadic, are difficult to follow.

Christmas trees are a unique commodity because market value is based mostly on sentiment aroused by seasonal festivities. Christmas trees have a market value as families and businesses prepare for the holiday season; but after Christmas, cut trees lose their value.

An earlier study has shown that here in New Mexico, quality alone is the most important factor in determining retail price early in the holiday season. As Christmas Day approaches, size becomes the more important factor.

Popular species throughout the state and Texas (where many New Mexico produced trees are sold) include white fir, pinyon pine, Douglas-fir, Scotch pine, blue spruce and Englemann spruce. Popularity of species varies on a regional basis. White fir has been a best seller in the Albuquerque-Santa Fe area in recent years, while Lubbock, Texas prefers Douglas-fir.

Characteristics of Good Christmas Trees

Quality has become one of the primary factors for pricing Christmas trees. Accordingly, the successful grower must gear his operation toward quality production. To do this, decisions in the over-all process must rest on an ability to evaluate traits that affect the grade of a Christmas tree. Christmas tree growers must know the kind of product they are trying to produce.

A Christmas tree plantation can earn profits if growth rate is adequate and trees conform to shape and density standards as follows: (Study Figure 1 for descriptive terms)
1. A single and straight main stem, including a well developed, but not excessively long leader.
2. A dense to moderately dense crown. ("Crown density" refers to the compactness and amount of foliage present).
3. A symmetrical cone-shaped crown.
4. The crown should be neither too broad nor too narrow in terms of height. "Taper" is a term used to describe the width of a tree relative to its height. A taper below 40 percent is termed "candlestick" and a taper above 90 percent (70 percent for species other than the pines) is described as "flaring." A taper of 40 to 90 percent for pines (40 to 70 percent for all other species) is considered acceptable.
5. The tree should have good overall balance. To evaluate "balance", the crown is considered in terms of completeness of fullness on four faces (quarters or sides) and three segments of length (bottom, middle, and top).
6. The bottom whorl of branches should be strong because this provides the optical foundation over which the rest of the crown is developed.
7. The tree should have a handle sufficient in length for mounting the tree in a holder (usually 1 inch for each foot of tree height, plus a small allowance for sawing to obtain a fresh cut preparatory to mounting the tree in water). The "handle" is that part of the main stem below the bottom whorl of the branches.
8. The tree should be fresh, healthy, and clean. "Fresh" needles are pliable and firmly attached. A "clean" tree is practically free of undesirable foreign material.
9. The tree should retain needles throughout the Christmas season.
10. Certain miscellaneous and perhaps minor features, such as fragrance and presence of cones, also enhance the tree's attractiveness.

Christmas Tree Grades

The Agricultural Marketing Service of the U.S. Department of Agriculture has established three standard grades for Christmas trees: U.S. Premium, U.S. No. 1 and U.S. No. 2. Many of the desirable traits listed above are involved in the minimum requirements for the three grades or marketable trees recognized under these standards (see Table 1). Trees that fail to meet even minimum requirements under the standards, fall under a fourth grade, called "culls". Growers can apply grading rules as criteria for evaluating crop quality, even though trees may not be marketed by grade.

Table 1. U.S. Standards for Christmas Trees

<table>
<thead>
<tr>
<th>Grade</th>
<th>Density</th>
<th>Taper</th>
<th>Balance</th>
<th>Foliage</th>
<th>Deformities</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Premium</td>
<td>Medium</td>
<td>Normal</td>
<td>4 faces free from damage</td>
<td>Fresh, clean, healthy &amp; well trimmed</td>
<td>Minor only</td>
</tr>
<tr>
<td>U.S. No. 1</td>
<td>Medium</td>
<td>Normal</td>
<td>3 faces free from damage</td>
<td>Fresh, clean, healthy &amp; well trimmed</td>
<td>Minor only (noticeable deformation permitted if tree is otherwise U.S. Prem.)</td>
</tr>
<tr>
<td>U.S. Choice</td>
<td>Medium</td>
<td>Normal</td>
<td>3 faces free from damage</td>
<td>Fresh, clean, healthy &amp; well trimmed</td>
<td>Minor only (noticeable deformation permitted if tree is otherwise U.S. No. 1)</td>
</tr>
<tr>
<td>U.S. No. 2</td>
<td>Light</td>
<td>Normal</td>
<td>2 adjacent faces free from damage</td>
<td>Fresh, fairly clean, healthy &amp; well trimmed</td>
<td>Minor only (noticeable deformation permitted if tree is otherwise U.S. No. 1)</td>
</tr>
<tr>
<td>U.S. Standard</td>
<td>Light</td>
<td>Normal</td>
<td>wand</td>
<td>Fresh, clean, healthy &amp; well trimmed</td>
<td>Minor only (noticeable deformation permitted if tree is otherwise U.S. No. 1)</td>
</tr>
</tbody>
</table>

**Fig. 2.** Tree shapes according to U.S. Department of Agriculture Standards of Taper
Species for New Mexico

Choice of species to plant will depend on site conditions, availability of planting stock and expected markets. In general, native species are the most dependable Christmas tree producers.

Table 2 lists species that are most successfully grown in New Mexico.

A more detailed description of the species adapted to New Mexico conditions follow. Growth rates will vary considerably with site, seed source and culture.

**Douglas-fir (Pseudotsuga menziesii)**, is a native evergreen tree species of New Mexico. It usually does extremely well on deep, internally well-drained soils. High quality Christmas trees have been obtained in 6 to 12 seasons.

Douglas-fir normally has a dense crown with a conical shape. It has moderate resistance to drought in native elevation range (6,500 to 10,000 feet), but requires supplemental watering when planted at lower elevations. Resistance to cold temperatures is moderate.

Douglas-fir makes slow initial growth. Seedlings may remain low and bunchy for a number of years. Some trees start height growth well in advance of others. Once height growth has begun, the rate of subsequent growth is good. One important aspect of Douglas-fir Christmas tree production is that additional trees can be grown from stumps after the first trees have been cut. Crops grown from stump sprouts can be harvested on a much shorter rotation without sacrificing quality.

**White Fir (Abies concolor)** is a native evergreen species of New Mexico. The tree is conical with regular whorls of stout branches. It is fragrant, has excellent Christmas tree form and color (bluish green). It grows slowly taking 10 to 15 years to reach six feet. It has low resistance to heat, drought and alkalinity. It is cold-resistant, but foliage may be damaged by winter wind and early frost in mountain valleys. White fir maintains needles throughout the Christmas season and can be shipped without loss of quality.

**Colorado Blue Spruce (Picea pungens)** is an evergreen tree with a natural conical shape. It has moderate resistance to drought and alkalinity, and high resistance to cold. Needles are sometimes extremely sharp and stiff and some may fall before the holiday season ends. It should be favored as a live potted tree for these reasons and because cut trees become brittle during shipment. It requires supplemental watering at low elevations. Estimated time to produce a marketable Christmas tree is 10-15 years.

**Ponderosa Pine (Pinus ponderosa)** A native evergreen species of New Mexico. Young ponderosa pine has a pyramidal shape which changes to a more conical shape with age, but does not respond well to shearing. Growth is best on well drained soils. It is moderately resistant to drought and cold but shows low resistance to alkalinity. Tip moth may present a problem. Estimated time to produce a marketable Christmas tree is 10-15 years without irrigation.

**Scotch Pine (Pinus sylvestris)** One of the most extensively planted European tree species. With enough open space, grows into a shapely tree, and so is very popular and brings a good price to growers. It grows best in moderate climates on well drained soils where soil is deep and moist. It has moderate resistance to drought and alkalinity, and a high resistance to cold. With irrigation provided, Scotch pine will usually require 5 to 7 growing seasons after planting to reach Christmas tree size. NOTE: You must be careful to select the proper seed origin to avoid winter yellowing of foliage. Fertilizers will not correct discoloration. You

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Fig. 3: White fir (Abies concolor) Christmas tree ready for harvest.
should depend on sources from Spain, France or Turkey to avoid problems. Artificial foliage spray may be applied if some of the fast growing selections from northern Europe are chosen.

**Afghanistan Pine (Pinus elliottii)** Medium sized evergreen which was recently introduced to the United States from southwest Asia. It produces evenly spaced branch whorls each year resulting in a dense conical-shaped tree which requires little shearing. Afghanistan pine develops an extensive multiple root (tap root) system at an early age which gives it the ability to survive in hot, arid climates. It has high resistance to drought and alkalinity and moderate resistance to cold. No special fertilization is required. It grows best on well drained organic soils. Christmas trees can be produced in three to four years, two years from seedling in some cases.

Afghan pine is not usually hardy above 5,000 feet elevation, unless protected from the cold. Because it grows vigorously into the fall months, foliage tends to dry abruptly when cut trees do not receive water from the consumer. Irrigation may be withdrawn toward the end of the production cycle to avoid late growth. Again, TREES MUST BE WATERED IN THE HOME TO AVOID FIRE HAZARD!

Because Afghan pine grows well in southern New Mexico, it can be used as a potted Christmas tree and transplanted, where species such as blue spruce would not survive.

**Arizona Cypress (Cupressus arizonica)** is a native of Arizona. It has a tendency to develop columnar, rather than conical form, and is considered fair as a Christmas tree. A rapid grower, it reaches six feet in three to six years. It will survive well in sterile or alkaline soils with moderate to heavy watering during hot periods, through the first two years after planting. Although somewhat resistant to drought once established, Arizona cypress should be limited to the lower 1/3 of New Mexico due to lack of cold hardiness.

**Pinyon Pine (Pinus edulis)** Pinyon grows naturally in open stands on arid slopes. It has a conical shaped crown during juvenile years which becomes round as trees mature. Pinyon will succeed on exposed, dry slopes, but has little resistance to frost. Seedlings and new growth exhibit a bright bluish color. Pinyon is extremely slow growing. Growth rate is somewhat better when irrigated.

**Southwestern White Pine (Pinus strobus)** There is a growing interest in the culture of southwestern white pine, which is closely related to limber pine. Foliage is soft and blue green and very attractive. With irrigation, trees should reach harvest size (5 to 7 feet) within 7 to 10 years. Growers are cautioned to avoid the much slower growing limber pine and should specify southern New Mexico seed source.
<table>
<thead>
<tr>
<th>Species</th>
<th>Moisture Requirement</th>
<th>Shade Tolerance</th>
<th>Elevation</th>
<th>Needle Characteristics</th>
<th>Market Acceptability</th>
<th>Ornamental Baled Stock Possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas-fir</td>
<td>Normally on moist site, however, is drought resistant when established, seedling survival difficult.</td>
<td>Intolerant</td>
<td>4,000 ft. - 10,000 ft.</td>
<td>Short, deep green, good holding capacity.</td>
<td>Good, prime demand for boughs.</td>
<td>—</td>
</tr>
<tr>
<td>White Fir</td>
<td>Requires moist, well-drained site.</td>
<td>Tolerant</td>
<td>5,500 ft. - 10,000 ft.</td>
<td>Long, silver-blue or silver-green, excellent holding capacity.</td>
<td>Excellent</td>
<td>Occasionally used as an ornamental.</td>
</tr>
<tr>
<td>Alpine Fir</td>
<td>Requires moist site.</td>
<td>Tolerant</td>
<td>7,500 ft. - 9,500 ft.</td>
<td>Medium blue-green twisted &amp; bushy, Excellent holding capacity.</td>
<td>Good</td>
<td>—</td>
</tr>
<tr>
<td>Colorado Blue Spruce</td>
<td>Requires fertile soil &amp; abundant moisture; however, will withstand drought and temperature extremes when established.</td>
<td>Tolerant</td>
<td>3,500 ft. - 9,500 ft.</td>
<td>Short silver-blue or blue-green, fair holding capacity if kept moist, stiff &amp; sharp pointed.</td>
<td>Good</td>
<td>Excellent Ornamental</td>
</tr>
<tr>
<td>Ponderosa Pine</td>
<td>Grows on dry sites, will occur on sterile site, drought resistance.</td>
<td>Intolerant</td>
<td>5,000 ft. - 8,000 ft.</td>
<td>Long, blue-green, good holding capacity.</td>
<td>Fair</td>
<td>Good Ornamental</td>
</tr>
<tr>
<td>Scotch Pine</td>
<td>Intolerant, may grow on moist sites. Does best in deep, moist soil, use European strain.</td>
<td>Intolerant</td>
<td>4,000 ft. - 8,000 ft. Mountainous areas in southwestern &amp; southeastern part of state</td>
<td>Long, blue-green stiff, good holding capacity.</td>
<td>Good</td>
<td>Good Ornamental</td>
</tr>
<tr>
<td>Pinyon Pine</td>
<td>Grows in dry, shallow soils.</td>
<td>Intolerant, however, seedlings somewhat tolerant.</td>
<td>5,000 ft. - 8,500 ft.</td>
<td>Medium green, good holding capacity.</td>
<td>Good</td>
<td>An excellent ornamental, high value for deformed trees.</td>
</tr>
<tr>
<td>Afghanistan Pine</td>
<td>Best on well drained organic soils, high resistance to drought.</td>
<td>Intolerant</td>
<td>Up to 5,000 ft.</td>
<td>Long, blue-green, dark-green, good holding capacity.</td>
<td>Fair</td>
<td>Good Ornamental</td>
</tr>
<tr>
<td>Arizona Cypress</td>
<td>Normally moist site, drought resistant once established.</td>
<td>Intolerant</td>
<td>1,000 ft. - 5,500 ft.</td>
<td>Scale like blue-green.</td>
<td>Fair</td>
<td>Good Ornamental</td>
</tr>
<tr>
<td>Rocky Mountain Juniper</td>
<td>Best on moist, sandy or gravelly soils, withstands drought.</td>
<td>Intolerant</td>
<td>5,000 ft. - 9,000 ft.</td>
<td>Very short, dark-green, some with silver cast, good holding capacity.</td>
<td>Fair</td>
<td>Good Ornamental</td>
</tr>
</tbody>
</table>
**Site Selection**

Where to establish the plantation is often one of the most important questions a potential grower must ask. Many factors should be taken into consideration.

Plant on the cooler east and north slopes. However, factors of the soil outweigh slope consideration. Although fertilizers can convert low nutrient availability, poor soil physical condition is difficult, if not impossible, to change. Trees survive better, grow straighter, and withstand drought longer in deep soils; which provide good vertical moisture drainage, aeration and moisture storage in the root zone. Soil consisting mainly of sand, clay, silt and organic matter is usually the best. Extremely rocky sites should be avoided because planting is difficult. Only plant on rich soils if your area has low rainfall or there is a short growing season. Abandoned old fields on upland slopes and ridges usually provide the best planting sites.

Livestock must be kept out of the plantations. Browse and antler damage may become a serious problem. Roadside locations increase the likelihood of fire and theft. The stealing of trees for Christmas or for landscape planting constitutes a serious protection problem for plantation owners.

There is a definite advantage in having plantations near good market areas. This reduces transportation costs and it is less difficult to make sales contacts. Growers near population centers may want to consider developing a choose-and-cut or self-service retail trade or operate retail yards in town. However, the suitability of a given piece of land to profitable Christmas tree production and the ability of the grower, control success more than does the distance to markets.

**Establishing A Plantation**

**How Much Land to Plant**

A reliable rule is to plant only the area or number of trees that can be managed properly or are expected to be sold. Every grower should have a planting plan by species, based on establishment of a new stand of trees each year, so that when harvesting begins it can continue annually with the same number of trees to harvest each year. Factors involved here are the total number of acres available to plant, the area converted to roadways, lanes, building sites, waste land, etc., the average rotation age to harvest, the years needed to clean up the land for replanting and the number of years required to harvest a given area. The formula thus becomes:

\[
\text{Area to be Planted} = \frac{\text{Total Land Area (acres)} - \text{Wasteland (acres)} - \text{Building Sites Roadways & Lanes (acres)}}{\text{Average Rotation Age (years)} + \text{Harvesting Period (years)} + \text{Fallow or Clean-up Time (years)}}
\]

Let us assume an ownership of forty acres of land, with a two acre building site, four acres of roadways and lanes and two acres of wasteland (unplantable). The grower will be growing Scotch pine with a 5 to 7 year rotation period. Also, two years of fallow. The formula becomes:

\[
\frac{40 - 2 - 4}{6 + 2 + 2} = \frac{32}{10} = 3.2 \text{ acres annually}
\]

This means that three and two tenths acres will be planted each year. At the end of the fifth year, some trees will be ready for market but only the larger ones should be harvested leaving the smaller ones to market the sixth and seventh year. By planting 3.2 acres each year, thereafter, a continuing annual harvest will be assured. The number of trees reaching harvestable age will be less than the numbers planted; some trees will be culls, and inevitable losses will occur. About 75% saleable trees are considered necessary for minimum success. If percents of marketable trees are much lower, some other land use should be considered.

**Site Preparation**

Planning site preparation is the first step to successful tree survival. Necessary steps prior to planting are:

1. Plowing followed by summer fallowing on non-irrigated sites during the year prior to spring planting; fall plowing for irrigated sites to be
planted the following spring. Make sure that all competing vegetation is removed, especially perennial grasses.

2. Disking and harrowing just before planting.

3. Shaping the site for irrigation ditches.

4. Locating access lanes (about every 200’ and along the contour. Occasional diskng makes them usable as fire breaks).

5. Constructing fencing to exclude livestock.

6. Having irrigation water immediately available for first irrigation right after tree seedlings are planted.

7. ReadyIng a heelIng-In bed (seedling In-ground storage area for bareroot seedlings) if all site preparation will not be completed before the date seedlings are to arrive.

Care of Planting Stock

The quality of the planting stock and the care given to it have much to do with a successful Christmas tree venture. Directly Involved are the percentage of trees that will survive and the vigor of those that do live.

Bareroot Stock  The most Important consideration in handling nursery stock, is to keep seedlings cool and roots moist at all times. The trees must be kept moist until field planted! DO NOT LET THEM DRY. When seedlings are received from the nursery, bundles should be opened and the trees planted. If seedlings cannot be planted immediately, they should be refrigerated or stored in a cool area. Stock may be stored In refrigeration with the bundles unopened. Temperature should not be above 38 degrees F nor below 33 degrees F. Humidity should be above 90 percent. Each bundle of trees should be watered once a week. This may be done by standing the bundles on end and pouring water Into the center of each one. Allow excess water to drain off before laying the bundle horizontally. DO NOT store seedlings any longer than necessary. Under the best refrigeration conditions, three weeks to a month should be maximum.

Another method of temporary storage for seedlings is “heeling-in.” This is done by digging a V-shaped trench deep enough to receive the full length of the roots. Spread the trees out along the trench and cover the roots with moist soil, then water.

Containerized Stock  Two of the major causes of plantation failures in the Southwest are poor physical condition of seedlings, stemming from improper lifting and refrigeration.

Containerized seedlings minimize the impact of these factors on plantation survival. The container method permits seedlings to begin and maintain rapid root growth in a near-natural condition. Seedlings are able to make better use of soil moisture and shock from transplant is reduced. Containers also protect seedlings from mishandling. Survival may be considerably better for container stock than bareroot seedlings on adverse sites.

If the seedlings cannot be planted immediately, store in a shaded area and keep moist. Water about every two days. NEVER use the “heeling-in” method or store them In a refrigerator.

New Mexico State Forestry’s Tree Seedling Program has available various species of containerized seedlings. Containerized stock available (species availability subject to change): Douglas-fir, white fir, Colorado blue spruce, ponderosa pine, Scotch pine, Afghanistan pine, and Arizona cypress. (See Appendix 2 for Information on where to obtain planting stock and assistance).

When to Plant  Most New Mexico tree planting is done in the spring. (Mid-March to Mid-May). The main consideration is to plant just after the last frost and just as soon as the top 18” of soil has thawed out. Fall planting may be considered only when there is no danger of frost heaving at the site and when deep winter snow cover is assured. Seedling survival is increased when the trees are planted prior to Spring growth.

Use of containerized stock will enable the grower to wait for New Mexico’s summer rains. Container seedlings should be planted prior to Mid-July in the northern half of the State to allow sufficient root development before winter. Fall plantings as late as October have been successful in the lower one-third of New Mexico.

Planting the Trees

1. The period of exposure between removing planting stock from the bundles, transplant beds, or where they are heeled-In; and placement in the hole should be as short as possible. Take only enough trees so that they can be kept moist. Carry the roots in a box, bucket, or tray. This will make it possible to cover the roots with wet peat moss, sawdust, sloppy mud, or moist burlap. Take out one seedling at a time for planting. Dry roots may mean dead trees.
Fig. 8: New Mexico State Forestry's Tree Seedling Program has available various species of containerized seedlings. The container method permits seedlings to begin and maintain rapid root growth in a near natural condition. Containers also protect seedlings from mishandling.

2. Containerized seedlings may be watered prior to extraction to facilitate separation of root plug and container. The planting hole should be dug slightly deeper than the length of the plug. Dry surface soil should be removed before the hole is prepared. Satisfactory planting tools include power or hand auger, shovel, mattock, or planting hoe.

3. Place seedling in hole at the depth it grew in the nursery. This depth is indicated on the stem by the ground line, which is usually about one-half to one inch below the first needles. It is better to plant a little too deep than too shallow, but never deep enough to bury any foliage.

4. Let the roots hang naturally without turning or twisting.

5. Hold the tree in this position with one hand; then fill in with soil (about a third at a time), and tamp firmly with the other hand until the hole is filled. Firm tamping is necessary to avoid air pockets.

6. Use only moist mineral soil to fill the hole. Do not mix soil with snow, grass, sticks, rocks, etc. The roots must be in direct contact with the soil.

Fig. 7: Containerized seedlings may be watered prior to extraction to facilitate separation of root plug and container.

1. Swing hoe to get full penetration.
2. Lift handle and pull to widen hole.
3. Place seedling while using hoe to hold back soil.
4. Use hoe to pack soil at bottom of hole.
5. Use hoe to pack soil at top of hole.
6. Firm soil around seedling with feet.

Fig. 8: Planting with a Hoe (Bareroot seedlings)
7. After the hole is filled, tamp again with your heel or handle of the planting tool. Tamp firmly.
8. Cover the ground around the tree with a thin layer of loose soil as a mulch, or mulch with other material.
9. Water after planting to aid in packing the soil around roots and to assure ample water for a start.

One man power augers have become popular in recent years, and a simple unit can keep three or four men busy planting. Auger planting works best in loamy soils and can be difficult on sites with heavy clay, rocks, or massive roots. Heavy litter or vegetation on the soil surface must be scalped away ahead of the auger or the soil from the planting hole is lost in this surface debris.

Machine planting is practical only when soil conditions are favorable to adequate machine packing of the ground around the seedling root system. Heavy soils which are wet or sticky at planting time should be planted by

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Fig. 9: Machine augers can speed the work and can be operated by one man.

Fig. 10: Machine planting of Afghan pine on irrigated land in southern New Mexico. Conventional farm machinery with farm-constructed planter can reduce planting time.

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one of the several hand methods discussed. **Soil should be moist when seedlings are planted.**

The size of planting, condition of the site, and the availability of a planter are main considerations in determining whether or not to use a planting machine. Machine plantings usually give better survival than hand methods on sites that are favorable for machine operation. Hand planting may be more economical than machine planting, if the planting operation involves less than a few thousand trees. On large planting jobs, a machine usually will cut planting costs considerably. Hand planting generally averages between 300 to 600 trees per man day on well prepared sites. Planting machines ordinarily range from 600 to 1,000 trees per hour. (Contact your nearest Division of Forestry office for more information and assistance as to how to plant your trees).
**Spacing**

Proper spacing is an important item in plantation management. Seedlings are small and the tendency is to plant them thicker than they need to be. Two common spacing methods used are 5 X 5 and 6 X 6 feet. The 5' X 5' spacing allows room for development of a six to eight foot tree; the 6' X 6' spacing a little taller. A closer 4' X 4' spacing can be used if smaller trees (table tops) are harvested before reaching the usual six to eight foot size, or if especially narrow (less than 50 percent taper) trees are to be produced. The number of trees per acre using these spacings is:

- 4' X 4' ................... 2,722
- 5' X 5' ................... 1,742
- 6' X 6' ................... 1,210

Tree spacing patterns may be either:

<table>
<thead>
<tr>
<th>X X X X X</th>
<th>X X X X</th>
</tr>
</thead>
<tbody>
<tr>
<td>X X X X X</td>
<td>X X X X</td>
</tr>
<tr>
<td>X X X X X</td>
<td>OR</td>
</tr>
</tbody>
</table>

The spacing example on the right allows for more even crown development with slightly closer between row spacing.

Moisture availability, cultivation machinery and markets will determine optimum spacing. These factors should be given consideration in the planning stages.

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**Plantation Management**

During the first two years after planting the grower’s main concern should be to keep the trees alive and healthy. Survival and soil moisture go “hand in hand”. Any practice or procedure that will maintain good soil moisture should be followed.

**Irrigation**

Plantation irrigation is necessary in New Mexico. Amount and frequency will vary according to site and soil type, but even at high elevations some irrigation during the first year is necessary for satisfactory survival and establishment. In hotter, drier areas, irrigation should be planned for one to two week intervals during the summer, or until rain restores soil moisture. Seedlings should be irrigated often enough to keep soil moist and plants in active growth. It is especially important to have water available when succulent new growth appears and during bud development. New growth will droop and die back if water is withheld, resulting in poorly formed trees. Supplemental water can be applied through sprinklers, trickle emitters or by flooding. The method of choice will depend on water source, cost of labor and equipment and topography.

**Weed Control**

A serious handicap to survival and good development of a young plantation is competition for soil moisture and light by other vegetation. Weed control is beneficial and essential in that it (a) reduces competition, (b) lessens danger of rodent damage and (c) reduces fire hazard. Weed control within 3 to 4 feet of seedlings is necessary until trees have grown well above the influence of grass or weeds that may become established. Control is recommended for at least the first two years following planting. Keep your planting free of weeds and grasses by SHALLOW cultivation or with herbicides. Cultivation can be done with one of several types of mechanical cultivators suitable to soil type and farm machinery available. You must balance weed control measures with proper concern for soil erosion that might arise from cultivation. Consult your local Soil Conservation Service to avoid irreparable damage to your land.

In the Southwest, much attention is usually given to perennial grasses because they grow primarily during the spring dry period of May and June, and are capable of using most of the available soil moisture at the expense of newly planted seedlings. On abandoned croplands, seedlings must contend with alfalfa with high water requirements and the ability to strongly compete for moisture in the upper 6 inches of soil.

Most growers today use various chemicals for weed control. Herbicides
can be effective in reducing weed growth within the tree row. Some herbicides can be applied at low rates per acre over the tops of newly planted seedlings with very good results. Contact your nearest District Forester or County Extension Agent for the best chemical to use and the method and rate of application for your area. If you decide to use an herbicide, be sure to read all directions and labels very carefully. REMEMBER: Herbicides can damage or kill trees if applied without proper care.

**Mulching**

In areas protected from strong wind, a light mulch of leaves, leafmold, wood chips, or other similar material around seedlings may conserve soil moisture. Mulching also reduces soil temperature and discourages weed growth.

**Fertilization**

Fertilization is used to improve color, luster, and density of needles and to increase growth rate and vigor of leaders and branches. Slow growing trees with light, off-color needles and weak branches are most likely to benefit.

_Fertilizer must be used with caution!_ Improperly applied, fertilizers injure seedling roots, cause needle browning, and trees may grow too fast. In addition, stimulation of competing vegetation may cause serious management problems. Large scale applications should not be made until sufficient small trials have proven the effectiveness of the application under local conditions.

Fertilization of trees at planting time may burn roots and is not recommended. Once trees are established, fertilizer can be applied in bands alongside trees, or scattered evenly under the drip line of the tree. Fertilizer should never be placed in direct contact with the root system.

The rate of application varies considerably, depending on soil deficiency. However, one-third to one-half cup of fertilizer is usually adequate for newly established trees. Fertilizer should be added in early spring, before trees break dormancy.

Generally, the most common deficiency is lack of nitrogen, especially in abandoned fields. Best results from nitrogen fertilizer are obtained by scattering it evenly under the drip line in early spring, when buds first begin to swell. Nitrogen increases green color, needle bulk, and branch stiffness during the following summer and fall. It stimulates height growth only slightly during the first growing season after its application, but frequently doubles during the second growing season. Therefore, nitrogen should normally be applied only to those trees that will be cut the same year, except on sites where growth is extremely slow or where shearing is contemplated. Nitrogen should be applied only where good weed control can be maintained.

Use of fertilizers will stimulate the growth of grass and weeds and an effective herbicide program should be coordinated with nutrient applications.

**Other Protection Problems**

Trees of seedling size are subject to various forms of weather and animal damage.
1. Fire protection is essential. Fire can suddenly and completely destroy a Christmas tree plantation. The likelihood of fire is a paramount consideration in selecting a plantation site. A firebreak around the plantation should be cleared of all vegetation and kept clean. Any brush or other material from the original site preparation should be disposed of prior to planting. Weed control within the plantation will also reduce fire hazard.

2. Theft and trespass are best guarded against by locating the plantation where it can be watched or patrolled. Theft can be a real problem at harvest time. (See Appendix 3 for state laws that help protect the landowner).

3. Deer may cause considerable damage to young seedlings. Where deer are numerous, trees may be browsed so badly that they become unacceptable as saleable Christmas trees. Also, after trees reach heights of 3 feet or more, they may be damaged by deer antlers. Deer repellants are not always reliable. The effectiveness of any repellant will be determined partly by the care used in its application, its weathering ability, the severity of the season, and general food availability. (The New Mexico Game and Fish Department can assist with problems that may arise from deer). Deer proof fences can be built and, in the long run, provide the best protection.

4. Rabbit and rodent damage can ruin a young plantation and control may prove difficult. Removal of cover, tight fences around the plantation and individual tree screens may offer solutions depending on severity of the problem and farm economics. Information about poison and repellants can be obtained from the New Mexico Game and Fish Department.

5. Seedling disease in New Mexico is not cause for concern in plantations. However, you should be on the look-out for insects that may cause serious damage. These include tip and shoot moths, pine needle scale, Ips engraver beetles, Douglas-fir tussock moth, and spruce budworm. Greatest damage can occur from pine tip moths, spider mites and spruce gall aphids.

   Pine Tip Moth These insects primarily attack very young ponderosa from 6 inches to 6 feet. Although mortality is rare, heavily infested trees may be severely stunted or deformed. Generally, ponderosa pine grow out of the susceptible state within a few years but the branch tips of pinyon are susceptible to attack for many years. The adult insect develops in May and June, and damage is evident in early summer. Tips, twigs, laterals, and terminals turn a straw color, and needles fall off in late fall.

   In the forest environment, chemical control measures are rarely necessary except in young plantations. Heavily attacked tree plantations may require an insecticide for control.

   Spruce Gall Aphid There are several kinds of spruce gall aphids which form cone-shaped galls on the terminal twigs of various spruce species. The most common in New Mexico is Cooley spruce gall aphid. It is often troublesome in Christmas tree plantations, where the young trees may be aesthetically damaged by large numbers of unsightly brown galls. These insects attack two different host trees: spruce and Douglas-fir. On small spruce Christmas trees, galls may be pruned off and disposed of before the release of the nymphs which become winged and migrate to Douglas-fir. It may also help to plant spruce or Douglas-fir exclusively, instead of planting both tree species together.

   Spider Mites Spider mites can be green, yellow, orange or red, often with black or dark pigmented patterns. The spruce spider mite can damage many of the conifers that may be grown in New Mexico as Christmas trees. Species of spruce, fir, junipers, pines and Douglas-fir are among the principal hosts of the spruce spider mite. Spider mites feed by sucking plant juices from the leaves with their needle-like mouth parts, thus causing spotting, fading, yellowing, silvering, brownning, and premature fall of leaves. Heavy infestations may be detected by the conspicuous webbing.

   Spraying of the trees may be necessary, but the right spray must be used because some chemicals aggravate mite infestations. Contact your nearest District Forester or the Forestry Division in Santa Fe if you suspect insect damage.

6. Root rots often result from over-irrigation and can be controlled somewhat by cutting down on frequency of irrigation.
Natural Stand Conversion

Natural stand conversion should be considered if you own forest land with stands of small trees of species in demand for Christmas trees. You must determine if the trees exhibit desirable growth characteristics. This can be done by observing the vertical distance between branch whorls. The stand must also be accessible for tree removal in October and November.

Good planning is the key to converting a natural stand of small trees to profitable Christmas tree production.

Three steps are required:

1. Hardwood control: Remove competing hardwood trees and brush.
2. Space thinning: Remove excess trees so that the best trees may develop into quality Christmas trees. Periodic thinning can eliminate:
   * Crowding which creates competition for nutrients and space and slows growth.
   * Unwanted trees which fail to develop into marketable stock.
   * Trees too large for Christmas trees and not needed for seed trees.
   * Unwanted species.
3. Basal pruning: remove unwanted lower branches between bottom whorl of the saleable tree and the ground. One or more whorls may be left near the ground if completed basal pruning would remove as much as ½ of the total tree crown, or if stump culture is to be practiced.

The final step to converting the natural stand to a productive area is development of an all-weather access road to the Christmas tree area.

Natural Stands of Pinyon Christmas Trees

Pinyon trees can be harvested and cultured into saleable Christmas trees. They can also be cut on a rotation basis if desired.

Cultural techniques include thinning, pruning, and shearing, stump culture, and weed control. If the management goal is complete conversion, then these techniques would be applied to trees surviving cabling or chaining. Regeneration planting may be needed to sustain tree production on some sites.

Thinning involves removal of trees in dense stands so that those remaining will receive sufficient sunlight for limbs to develop uniformly on all sides. During thinning, "handles" can be made on main stems of trees by removing branches for a foot or so below what will become the basal whorl of the tree. These are cut below a full whorl of branches, leaving several branches at the base of the tree for stump culture subsequent to harvest. A few years after the tree has been cut, limbs begin to turn up and with the exception of one main stem, are pruned.

Pruning and shearing of pinyon trees in natural stands will create a more attractive Christmas tree, competitive with artificial and plantation grown trees. (See Figure 2 for acceptable tree shapes).

Fig. 12: Juvenile pinyon pine showing excellent taper and foliage density. Naturally grown specimens are a favorite of many New Mexico families.
Pruning Christmas Trees

Pruning sometimes referred to as shearing or shaping, is a reliable method of adding quality to Christmas trees. Properly conducted, pruning will raise the sale value of plantation trees and will reduce the number of non-saleable culls, thus increasing grower income and profit.

Shearing? Shaping? Pruning?

Shearing, shaping and pruning are all terms used by Christmas tree growers when referring to the art of a well-formed, compact, shapely tree. The term "shaping" is the most precise, and it is done by both shearing and pruning.

"Pruning" involves the studied and selective removal or cutting back of individual branches. Only long leaders are pruned back to a suitable length. Extra stems or leaders are pruned away, exceptionally strong side branches are pruned back to a node, and the bases of trees are cleaned by the pruning away of any superfluous or dead branches.

"Shearing" is the clipping of both terminal and lateral shoots. Shearing is usually confined to the removal of parts of the shoots of the current or most recent growing season. Shearing trims trees without consideration of individual branches. In either case, shearing or pruning the tree is being "shaped."

Pruning Objectives

1. Allow only one main stem and, therefore, only one leader.
2. Assure a sufficiently compact crown.
3. Develop symmetry and balance in the crown.
4. Establish and improve the base of the tree.

What Tree Shape is Best?

The ideal shape for Christmas trees should resemble a cone, wide at the base and tapering uniformly to the tip. The ideal tree would be about two-thirds as wide as it is high, or a taper of 66 percent. This means a tree that is six feet high would be 4 feet wide at the base. Acceptable taper in spruces and firs is from a minimum of 40 percent to maximum of 70 percent. In the pines, which often have a greater taper, acceptable standards will range from a minimum of 40 percent to a maximum of 90 percent. (See Figure 2).

When to Start Shaping Trees

The time to begin shaping will depend on growth of trees. Usually there is a period of slow growth while the tree is becoming established after which growth increases rapidly exceeding one foot per year. If rapid growth is not checked, the tree will have a spindly or "leggy" top. Pruning should be started as soon as the leader develops a length out of proportion to the laterals. Usually this occurs when the tree is 2 to 3 feet tall. This will be the third to fourth year after planting for most pines, third to fifth year for spruce and firs, and may be after the 1st year for such rapid growers as Afghanistan Pine.

Pruning techniques vary according to the species involved and tools used.

Seasonal Dates for Shaping Trees

All Pines  The shaping of pine trees is done in the late spring to early summer when the new growth ("candles" or extended buds) are still soft and succulent, after they have practically completed their elongation and before the new growth hardens to woody material. Clipping of leaders must be done at this time to allow sufficient time for buds to form. If clipping is done after the wood has hardened, the leader will die back to the branch whorl, resulting in deformity. Lateral branches are sheared at this time, and clipping confined to current growth. This new growth can be clipped back to any length depending on the amount needed for good taper. If an extra long lateral branch needs clipping back to old wood, the cut should be made near a side branch so as not to leave a stub of dead wood.

A simple rule to follow for pines is to shear when needles are 1/2 to 3/4 the length of last year's needles. The leader should be cut to one foot lengths and the top whorl to 6 to 8 inches. Lateral branches should be cut to maintain a cone-like symmetrical form.

Spruces and Firs  Unlike the pines, which are always pruned during periods of active growth, this group of trees is usually pruned during dormancy, that is, during late summer, fall, winter and early spring. Light pruning can even be done during the growing season, however, the dormant season is recommended for several reasons.

* work can be scheduled during the off season for other activities.
* weather is often more desirable for work.
* in dormant shaping the remaining buds receive additional nutrients during the following growing season and usually give added vigor to the tree.
* last year's shaping wounds are usually covered by current year's growth.
### Table 3.
**Approximate Time Schedule for Shearing the Pines**
(Slight Variations May Occur Due to Site Quality)*

<table>
<thead>
<tr>
<th>Dates</th>
<th>Age</th>
<th>Height of Trees</th>
<th>Practice to Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1</td>
<td>1st year</td>
<td>4 to 10 in.</td>
<td>None</td>
</tr>
<tr>
<td>to</td>
<td>2nd year</td>
<td>10 to 20 in.</td>
<td>None</td>
</tr>
<tr>
<td>Aug. 10</td>
<td>3rd year</td>
<td>20 to 30 in.</td>
<td>First shearing, remove multiple stems and deformities. Cut back terminal and laterals. Remove bottom whorl of branches to produce handle.</td>
</tr>
<tr>
<td>June 1</td>
<td>4th year</td>
<td>3 to 4 ft.</td>
<td>Second shearing, select main terminal, cut back, then shear laterals.</td>
</tr>
<tr>
<td>to</td>
<td>5th year</td>
<td>4 to 6 ft.</td>
<td>Third and fourth shearing—need little work. Pay special attention to terminal leader. Cut to length then clip any extra long growth from laterals.</td>
</tr>
<tr>
<td>Aug. 10</td>
<td>6th year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 15</td>
<td>7th year</td>
<td>5 to 7 ft.</td>
<td>Allow to grow out. Little or no shearing, except extra long terminals.</td>
</tr>
<tr>
<td>Dec. 30</td>
<td>8th year</td>
<td>Harvest</td>
<td></td>
</tr>
</tbody>
</table>

* On the very good sites, trees will grow rapidly and need shearing in their third year and will be ready for harvest at the end of the sixth growing season. On poorer sites the growth may be much slower; the trees will not need shearing until the fourth season, and will require 7 to 8 years to reach harvestable size.

### Table 4.
**Approximate Time Schedule for Shaping Spruces and Firs***

<table>
<thead>
<tr>
<th>Dates</th>
<th>Age</th>
<th>Height of Trees</th>
<th>Practice to Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 1</td>
<td>4th to 5th</td>
<td>20 to 30 in.</td>
<td>First shearing, remove multiple stems and deformities. Cut back leader and shear laterals. Remove bottom whorl of branches to produce handle.</td>
</tr>
<tr>
<td>Apr. 1</td>
<td>6th year</td>
<td>30 to 40 in.</td>
<td>Second shearing, clip main terminal and shear laterals. Cut out abnormal lateral growth.</td>
</tr>
<tr>
<td>Oct. 1</td>
<td>7th year</td>
<td>4 to 6 ft.</td>
<td>Same as above.</td>
</tr>
<tr>
<td>to</td>
<td>10th year</td>
<td>4 to 7 ft.</td>
<td>Allow to grow out and harvest.</td>
</tr>
</tbody>
</table>

*On the very good sites, trees will grow rapidly and need shearing in their third year and will be ready for harvest at the end of the seventh or eighth growing season. On poorer sites, the growth may be much slower; the trees will not need shearing until the fourth season, and will require 12 to 13 years to reach harvestable size.

### Pruning Tools
Many different tools are used for pruning and shearing. Personal preference, determined in part by one's training, is a factor. Small pruning shears of the anvil type are a good choice. Available in several sizes, they are light and less fatiguing than most cutting instruments. Hedge shears can be used effectively if you can avoid the tendency to prune in a stair-step fashion up the tree. A sickle and machete can be used to do a fast job. Trimming knives are used extensively in the Pacific Northwest. Growers that use knives are in most cases the ones that produce trees of superior quality. Safety precautions must be taken when using knives, and leg guards required.

Power driven hedge pruners are in wide use, but they are much more expensive to operate. Gasoline and electric powered models are available. Rotary types are the most popular of the power driven tools.

Pruning tools should be maintained in a sharp condition and any moving parts well oiled. Resin accumulations should be periodically scraped from the tool's surface or removed with such solvents as turpentine or mineral spirits.

### How to Shape and Shear

**Pines** Begin pruning by cutting the leader to desired length (12 to 14 inches is usually best); then clip the laterals of the terminal whorl so that they are shorter than the terminal. The leader is cut at 45° angles, with the slope of the cut facing west, promoting faster healing. An angle cut is needed to form a strong apical bud at the top end of the cut. Next proceed around the tree and clip all laterals so as to shape the tree into a cone. While shearing the lateral branches, it is best to hold the shears or knife at an angle so as to cut the branches in line with the contour of the cone rather than as flat steps. When using the knife, use a continuous downward stroke. Prune off the bottom whorl of branches to produce a handle at the base of the main stem.

On the second and third shearings, proceed in the same manner as for the initial shearing but take more care to select and insure a main terminal leader. Remember to hold the lower laterals in so the tree will have proper taper. Shearing should not be done during the last season before the tree is harvested except to remove obvious deformities.

### Scarring
1. **Basal:** Skin off strip of bark 4” to 21” long to generally slow the growth. Scar should be about 10” below bottom whorl to avoid damaging the handle.
2. **Leader:** Slice a thin strip from base of leader. This will slow leader growth one year without affecting the lateral branch growth below the scar.
Spruces and Firs. Begin shaping by first cutting back the terminal leader to proper length (8 to 12 inches). Make the cut at an angle ¾ to ½ inch above a good live single bud which will grow and develop into a terminal shoot.

**WARNING:** If this cut is made just above two or more buds in a cluster, you may encourage the development of multiple leaders.

After the main terminal is cut to proper length, proceed to shear the lateral branches and shape them into a cone-shaped tree without regard to individual branches. If there are some that are extra long, cut them back to form. Dormant buds will then develop and the new growth from these buds will cover up the shearing wounds. Remove the bottom whorl of branches to produce a handle at the base of the stem.

Second, third and fourth shearrings on these trees will be much the same as the first but with special emphasis upon maintaining a single terminal leader and satisfactory taper.

Stump Culture

If a tree is cut above a branch whorl, it will often turn upward and produce another tree or trees. Although less common, a new leader can also be produced by adventitious buds which develop below the cut.

When the superfluous branches are removed and the best is given routine pruning treatment, a good tree may result. Excess branches are removed to prevent crowding and interference with the favored branch.

*Pines* Pines may produce a new tree from an up-turned limb but these are generally less straight and usually the crowns are not as compact as the original tree. Because this practice often produces inferior trees, stump culture cannot be recommended as a general practice in pines stands.

*Douglas-fir and True Firs* Stump culture has the greatest value in both wild stands and plantations of the true firs and Douglas-fir. Branches left on the stump turn up in a very straight and erect manner and properly cultured can produce Christmas trees on a faster rotation than trees grown from seed.
Harvesting and Marketing

Harvesting

Cutting Although local markets will support cutting into December, harvest for wholesale markets is usually done in late October and throughout November. Trees at remote locations and higher elevations should be cut first, leaving more accessible trees for later removal in case of bad weather. Cutting should occur as close to the shipping date as possible to maintain freshness. Stored or stock piled trees should be kept in a moist, shady and cool place.

A harvest cut in any particular area may spread over 2 or 3 years, removing each year's prime trees. The area should be cut clear the final year and replanted, naturally reseeded or stump cultured.

Scotch pine will require early cutting to prevent foliage yellowing or browning.

Transportation Roughly 1,200 pilled white fir or 1,500 Douglas-fir trees may be loaded on a standard semi-trailer. Pines and blue spruce will fill a standard semi-truck with only 500-700 trees due to their stiffer branches. Roughly, 150-200 trees can be loaded on a 1-ton-flat-bed truck.

Careful loading is essential, as many of the trees may freeze and become extremely brittle. Damage to trees can be reduced if the truck is lined with boughs to cushion the trees.

Tree Bundling Some producers bundle trees just prior to shipping by:
1. Laying several trees across sawhorses and wrapping with twine.
2. Stove piping: shove tree, butt first, through a large diameter pipe, wrapping with twine as it comes out the other end. Tie with standard untreated binder's twine. Average production: 150-200 bundles per man per 8 hour day.

<table>
<thead>
<tr>
<th>Standard Tree Bundles (Bales)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Height</td>
</tr>
<tr>
<td>2' and less</td>
</tr>
<tr>
<td>2'-4'</td>
</tr>
<tr>
<td>4'-6'</td>
</tr>
<tr>
<td>6'-7'</td>
</tr>
<tr>
<td>7'-8'</td>
</tr>
<tr>
<td>8'-10'</td>
</tr>
<tr>
<td>10' and over</td>
</tr>
</tbody>
</table>

Many producers will pile their trees rather than bundling them. Piling trends to flatten the trees and often allows a greater number to be loaded on a truck. Trees recover well from piling if handled carefully during loading and unloading and if stood upright to thaw out. However, prolonged storage will cause needle loss.

Marketing

Marketing is the most poorly understood and mis-managed phase of the entire Christmas tree business, and must be a successful operation to achieve reasonable profit. After six or more years of planting, fighting weeds, insects, disease, rodents, deer, drought, floods and hail and shearing in 90 degree plus heat, the Christmas tree operator deserves a fair return on his investment. He must protect his interests with careful financial planning.

Most growers with a small number of trees to market should probably try to merchandise as many trees at retail as possible for they can receive a mark up for cutting and transporting the trees and will receive top dollar for their product. All retail sales should be cash, hence no loss or bad credit.

Medium size growers may wish to wholesale a portion of their crop and retail as many as time permits. The largest growers may find that their volume is such that they will operate only on the wholesale level.

Wholesaling Trees In wholesaling trees from the plantation, there are two major outlets. One is to dealers or other wholesalers, the other is directly to the retailer. In addition, some sales may be made to municipalities for street decoration. Generally, it is more profitable to sell directly to the retailer.

Method of Selling Trees There are a number of different methods available to the grower for the sale of Christmas trees whether you market trees cooperatively or as an individual.

1. Wholesaling
   A. On the stump
      1. Entire block, all harvestable trees
      2. Tagged trees
   B. Cut Trees
      1. Decked at the plantation
      2. Delivered to rail sidings
      3. Loaded on trucks or rail cars
      4. Delivered directly to retail lots

2. Retailing
   A. On the stump (buyer selection and cutting)
   B. Cut trees
      1. At the farms to retail trade
      2. At retail lots owned or rented by growers

3. Consignment
   A. Cut trees delivered to retailer on consignment, payment to be received only for trees sold—not recommended.
In making wholesale sales, contacts should be made early in the season (July or August). A sales contract should be executed and the grower should insist on partial payment at this time with the remainder paid at time of delivery. Such a contract should contain the following information:

1. Quantity of trees sold by species, size and grade.
2. Legal land description defining the cutting area boundaries, and description of the trees to be cut.
3. Price per tree or per linear foot and conditions of payment.
4. Date to start cutting and termination date of the agreement.
5. Identity responsible person for harvest, transportation of trees to place of delivery and payment toward sale.
6. Handle length.
7. Place and date of delivery.
8. When title to trees passes from grower to buyer.
9. Any special requirements or conditions (slash disposal, stump treatment, protection of uncut trees, right to use roads, repair of damaged improvements, bond to guarantee contract performance).

If more growers would have available printed contracts similar to the one illustrated (Figure 15) and insist on their use, far fewer growers would be left holding the bag after their trees were gone.

**Method and Time of Payment**  Christmas trees are a perishable product and their value drops precipitously on December 25th each year. Sellers should insist on being paid for their trees prior to this date by all except those dealers who have well-established credit.

**Retailing of Trees**  Highest per tree profits can be realized when the grower sells directly to the customer, but retailing is very demanding in time and sales imagination. Retail growers must be aware of the need and opportunities for effective advertising. Success will hinge on improved services: better trees, good display of merchandise, convenient and adequate parking, and a prompt and courteous sales procedure.

Grower-retailers often elect to operate well-located sales lots in or near cities. Another profitable method is “choose and cut” selling. Customers select, cut, and carry trees from the plantation. Buyers are often willing to drive long distances for this privilege and often pay higher prices.

---

**FIG. 15 Memorandum of Sale and Shipment**

<table>
<thead>
<tr>
<th>NO.</th>
<th>DESCRIPTION OR ARTICLES</th>
<th>This shipment shall not be delivered without payment of freight and other charges of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$__________ dollars</td>
</tr>
</tbody>
</table>

signature of CONSIGNOR

I certify that the above described articles were received in good condition and in the quantity specified.

signature of TRUCKER

Legal description of land where grown:

<table>
<thead>
<tr>
<th>Township</th>
<th>Range</th>
<th>Section</th>
<th>Portion of Section</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>______</td>
<td>______</td>
<td>__________</td>
<td>______</td>
</tr>
</tbody>
</table>

or, I have in my possession written evidence of the lawful acquisition of above article.

Witness (signature)        Legal signature of OWNER

Witness (signature)        Address

Address

36 37
Appendix 1
Costs and returns per acre for Christmas Tree Production

The following is a list of items to consider to determine if growing Christmas trees will be a profitable enterprise.

Costs of Growing Trees
Site preparation, labor
Site preparation, equipment
Purchase of seedlings
Planting, labor
Disking, labor
Disking, equipment
Herbicide application, labor
Herbicide cost
Mowing, labor
Mowing, equipment
Shearing, labor
Shearing, equipment
Fertilizer, labor
Fertilizer, cost
Protection, cost
General overhead
Total cash costs
Interest on costs, cumulative
Total growing costs

Harvesting costs
Labor
Equipment
Transportation
Total harvesting costs

Income
Gross income from tree sales
Net income after harvest cost

Net Income

Appendix 2
Additional Sources of Information

Containerized stock for Christmas trees can be obtained from the Department of Natural Resources, Forestry Division. Contact your nearest District Forester or the Division’s Santa Fe Office for information about the seedling program and for assistance.

SANTA FE OFFICE
P.O. Box 2167
Santa Fe, NM 87504-2167
827-5830

SOCORRO DISTRICT
District Forester
P.O. Box 946
Socorro, NM 87801
835-5728

CHAMA DISTRICT
District Forester
General Delivery
P.O. Box 123
Los Ojos, NM 87551
586-7497

LAS VEGAS DISTRICT
District Forester
P.O. Box 441
Las Vegas, NM 87701
425-7472

CAPITAN DISTRICT
District Forester
P.O. Box 227
Capitan, NM 88316
354-2231

BERNALILLO DISTRICT
P.O. Box 458
Bernalillo, NM 87004

Mora Research Center, located near Mora is an agriculture experiment station, where many field tests on Christmas tree production can be observed. Visit the facility at your convenience to see many of the species and methods described in the text.
Appendix 3
New Mexico State Laws

State statutes have been developed to protect the interest of the forest landowner and the forest resource.

68-2-22. Cutting and Removing Trees Without Written Consent; Christmas Tree Tag Fee

A. No person shall cut or remove for sale any woody material that is standing or lying on the ground from the land of another without written consent of the owner, whether the land is publicly or privately owned. The written consent shall contain a legal description of the land where the woody material is cut, the name and address of the legal owner and the volume or amount of material to be removed. The written consent or a true copy shall be carried by every person in charge of cutting or removing the woody material and shall be exhibited to any officer of the law, forestry agent, forest ranger, forest patrolman or conservation officer, at his request, at any time.

B. In addition, each evergreen or coniferous tree cut or removed from public or private land in New Mexico and being transported for the purpose of sale or being offered for sale in the state for the purpose of Christmas decoration; and all other trees being transported for the purpose of sale or being offered for sale in the state for the purpose of Christmas decoration shall bear a tag purchased from the State Forestry Division of the Natural Resources Department. The tag shall be attached to the main stem of the tree and shall not be removed except by the ultimate consumer or user.

C. Any officer mentioned in Subsection A of this section may:
   (1) inspect the woody material in any vehicle or other means of conveyance, including common carrier, to determine whether or not the provisions of this section have been complied with;
   (2) stop any vehicle or means of conveyance containing any woody material upon road or highway of this State for the purpose of making an inspection and investigation, and
   (3) seize and hold any woody material cut, removed, piled or transported in violation of this section. Upon determination by the appropriate court that this section has been violated, the Division may order disposal of the woody material and all money collected, if any, is to be paid to the State Treasurer for deposit in the current school fund.

D. Any person violating this section is guilty of a petty misdemeanor.

As used in 68-2-22, NMSA, 1978.
A. "woody material" includes any live or dead evergreen, coniferous or...
A deciduous tree, branch, bough, bush, sapling or shrub in its natural condition, trimmed or untrimmed, and with or without roots;

B. "owner" means any public agency, state or federal, person, partnership, firm, corporation or recognized agents thereof owning or having legal control to the surface rights of the land upon which the woody material is located and having legal authority to issue permits or enter into agreements for the disposal thereof;

C. "commercial forest" means forest land which is producing or capable of producing industrial wood. This includes areas suitable for management to grow crops of industrial wood of a site quality capable of producing in excess of twenty cubic feet per acre of annual growth; and

D. "prevention" involves the manpower, equipment, and training and the public programs designed to reduce the potential of accidental or malicious fire starts.

Literature Cited


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Moyers, W.H., "Random Notes about Christmas Tree Production." Colorado State University.

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Sloan, Roger P. and others. *The Culture of Christmas Trees: Fertilizing.* Forest Fact Sheet No. 4.