

## Christmas Trees

[Home](#) » **Christmas Tree Fertility**

# Christmas Tree Fertility

Optimum fertilization promotes quality growth and gives trees luxuriant foliage with a deep, rich color. Trees with balanced nutrients are more resistant to pest problems and environmental stresses. The amount of fertilizer or lime needed to achieve optimum nutrient levels in the tree will vary with different soils and sites or even different land use history. Too much of a nutrient is often as harmful to Christmas trees as too little. The only way to optimize tree growth is to follow through with site-specific fertilizer applications based on the results of timely soil and tissue analysis. Effective fertilizer management is an ongoing process that succeeds best when carefully planned and maintained throughout the crop rotation.

Soil samples should be taken regularly throughout the course of growing Christmas trees. The first soil samples should be taken during initial site evaluation. If the pH or nutrients such as phosphorus or calcium are low, materials can be tilled into the soil before tree planting with greater success than later top dressing of fertilizers or lime. Subsequent soil samples should be collected at least every other year, and many growers choose to take annual samples. Time invested in careful collection of soil samples will increase effectiveness of any following fertilizer applications. In North Carolina, soil sample boxes can be obtained and samples sent from any North Carolina Cooperative Extension Service County Center. The North Carolina Department of Agriculture provides soil and plant tissue analysis as well as other diagnostic services to in-state residents.

Once the trees in a field are well established, plant tissue samples should periodically be collected along with regular soil samples. Tissue analysis provides the status of 11 nutrients inside the plant (four more than reported in soil analysis). Tissue sampling also reflects what a plant is actually able to obtain from the soil, not just what is available. Under normal growing conditions, tissue samples should accompany the soil samples at about the middle of the rotation and then again the year before harvest. Usually about two shoots are collected from the same five to 10

trees from which soil is sampled. Tissue sampling is a necessary tool for evaluating and fine-tuning fertility management.

When fertility problems occur in a field, additional sampling can be useful. Problem areas should be sampled (and managed) separately from normal areas of a field. The contrast between normal and problem samples can often pinpoint the cause of a fertility problem. Often multiple-depth soil sampling can provide greater insight than a single topsoil sample. When nutritional problems occur, matching tissue samples should accompany any special soil sampling. It may take several seasons to correct a fertility problem.

Fertilizer materials should be targeted to the recommendations and deficiencies identified by soil and tissue analysis for each field, without applying a single blended material across the board. Annual applications of nitrogen per acre are recommended based on the requirements of the crop and the age and size of the trees. Different amounts of a nitrogen fertilizer will be needed depending on the percentage of actual nitrogen contained in it. Different nitrogen sources have varying effect on pH, soluble salt index, and leaching and should be selected accordingly. Different blends can also satisfy the need for certain amounts of phosphorous, potassium, or other nutrients and should be selected to fulfill the ratio of requirements for each nutrient. See Table 4 for a list of commonly used fertilizers and their characteristics.

**Table 4. Common fertilizer choices for Christmas trees**

<b>Name</b>	<b>Percent N-P-K</b>	<b>Lb Lime Neutralized by 100Lb of N</b>	<b>Additional Comments</b>
Ammonium Nitrate	33-0-0	180	High soluble salt content, can leach
Ammonium Sulfate	21-0-0	38	Used to lower pH
Calcium Nitrate	16-0-0	0	Source of soluble calcium
Urea	46-0-0	180	Concentrated form of N, leaches slowly

Diammonium Phosphate	18-46-0	180	Most available source of P
----------------------	---------	-----	----------------------------

Potassium Nitrate	13-0-44	0	
Balanced Blends	10-10-10 17-17-17 19-19-19	variable	Can be high insoluble salts and leach readily
Concentrated Super Phosphate	0-46-0	0	Best when incorporated
Murate of Potash	0-0-60	0	High soluble salts, best used in dormant season
Potassium Sulfate	0-0-50	0	Lower soluble salts, best used in growing season
Potassium Magnesium Sulfate	0-0-22	0	Good where Mg and K both needed

Both the timing and method of fertilizer application are critical to successful nutrient management. Different nutrients have their own requirements for timing. Materials with a high soluble salt content containing nitrogen or potassium should not be applied during the heat of summer or during a drought. Large applications should be split between two timings. Phosphorus should be built up early in a crop rotation rather than adding an incremental amount each season. Early in a rotation, many growers band fertilizer outside the dripline of small trees to maximize availability, but after trees are about 2 years old, broadcast applications are most effective. Where growers mechanize their fertilization, they are often able to achieve a more uniform broadcast application. While ground-applied fertilization is the primary method of nutrient delivery, it occasionally must be supplemented with foliar-applied liquid sprays particularly where micronutrients are deficient or tied up in the soil.

For a fertility program to succeed, a variety of tools and methods must be used, usually in different combinations from season to season.

## Best Management Practices to Protect Water Quality and the Environment

Although of primary importance, tree quality and net farm profit are not the only objectives that a Christmas tree grower should pursue. A farmer should manage the

crop in such a way that production can be sustained well into the future. To achieve this, the quality of life must be protected on all levels. Soil must be protected from erosion. Surface and groundwater must be protected from sedimentation and contamination by fertilizers or pesticides. Wildlife should not be harmed by any farming practices. The health of farm workers should not be endangered by improper handling, storage, or use of pesticides.

Christmas tree farmers who invest in practices and inputs that accomplish these goals usually show a greater long-term profit because the land is maintained at highly productive levels. Collectively, the added or alternative production practices that protect the quality of life are called *best management practices*. For production to be sustained, a combination of the following best management practices should be in place on every Christmas tree farm.

## Farm Road Construction

The roads on many farms are too steep, are constructed of easily erodible material, and/or are poorly designed to manage flood water. Roads constructed at no more than a 9 percent grade will not generally wash out. Adequate drainage ditches with large gravel or riprap will eliminate erosion of the roadbed and water drainage problems in fields below the road. Installing an adequate surface to handle traffic is also critical. With increasing grade, slope length, and traffic, fescue grass will fail before a gravel surface will. Professional advice from soil conservationists should be utilized to develop plans for long-lasting roads (and fields) or to solve problems with existing roads.



[Links to:](#)

<https://www.ces.ncsu.edu/content/uploads/2014/05/F-10.jpg>

Proper road and drainage construction prevents erosion and reduces potential for root diseases

## Field Borders and Stream Buffers

Field borders and stream buffers are perhaps the cheapest way to contain sediments and any nutrients or pesticides that are present in the sediments. A 10-

to 25-foot-wide grassy strip will trap sedimentation from all but the most severe rain storms. These strips can usually double as field roads.

## Low-Impact Site Preparation

Some land currently in Christmas tree production is too steep and erodible to bear extensive mechanical site preparation. Soils also may be too shallow or easily compacted to withstand the heavy traffic. Less disruptive site preparation practices have been developed for these situations. Any timber and brush is cut close to the ground without disturbing the mat of roots that hold the soil in place. All or a majority of stumps are left undisturbed. No tillage is attempted. If seedlings are planted mechanically, any areas near stumps are planted by hand or left empty. Hardwood sprouts from stumps are a greater problem with this approach, but labeled herbicides can control them. Achieving optimum fertility may also be more difficult without tillage, but by preserving the topsoil, Christmas tree production can be sustained on these difficult sites.

## Pest Scouting

By scouting for pests, growers can reduce the frequency of pesticide applications and the cost of pest management program while increasing the effectiveness of their efforts. Pest thresholds and scouting methods have been developed for most of the major Christmas tree pests. Information generated by scouting indicates the need for pesticide applications and assures that such applications are targeted to potentially damaging pest populations.

## Pesticide Alternatives

Where several pesticides are labeled for a specific Christmas tree pest, growers have the choice of selecting the material that is least toxic to beneficial insects, the environment, and wildlife. Toxicity of certain pesticides to specific groups of animals, such as fish or aquatic insects, can vary significantly. Safe pesticide choices will change depending on proximity to critical habitats or even the season and life cycle of vulnerable wildlife species. Some less-toxic materials may require different equipment, handling, or timing from traditional pesticide choices. Be sure to evaluate all factors when considering pesticide selection. For some pests, growers can apply pesticides at alternative times, such as fall or winter, when beneficial insects or at-risk wildlife are not present.

## Groundcover Management

Production of quality Christmas trees depends largely on the balanced management of weed competition. Unchecked weed competition hurts tree growth, but repeated exposure of the soil surface with resulting erosion will shorten the productive life of a field. Out of necessity, growers have moved away from predominant use of long-lasting pre-emergent herbicides and bare-ground weed control. Ground covers are the primary tool for stabilizing the soil within a field of trees. Best management practices involve suppression of native vegetation and/or establishment of cover crops. This reduces competition for nutrients, water, and space while maintaining almost total coverage of the soil. An alternative practice is to sow cover crops, such as clover or rye, that reduce germination of native weed seeds and that can be managed more uniformly. Regardless of the approach, groundcovers are a second crop that must be consciously managed in any Christmas tree field.



*Links to:*

<https://www.ces.ncsu.edu/wp-content/uploads/2014/05/fig11.jpg>

Groundcover suppression rather than elimination is a part of good management.

## **Nutrient Management**

In North Carolina regions having sandy soils and shallow water tables, nutrient management is a critical factor in the availability of clean and healthy drinking water. Large applications of fertilizer can possibly leach into the groundwater. Smaller applications spread out over a season can increase uptake by the crop and reduce the probability of leaching. Leaching of fertilizer into the groundwater is not generally a major problem, but some precautions are still necessary. Best management practices depend on regular use of soil and tissue analysis as the basis for all fertilizer and lime applications. Applications should be specific to the needs of each field. Where practical, annual nitrogen requirements should be split into two applications to reduce leaching potential and risk of salt injury to tree roots.

## **Pesticide Handling, Storage, and Disposal**

Pesticides are most hazardous when they are in concentrated form during mixing, storage, and disposal. Pesticides should always be mixed and loaded far away from

wells, springs, or streams. Progressive farmers are installing covered and contained concrete mixing pads, which capture any spills or rinse water. Secure pesticide storage areas are built on the same pads. PVC field mixing pads eliminate risky pouring from pesticide containers and cost less than permanent facilities. When empty, all liquid pesticide containers should be triple-rinsed and punctured before disposal in landfills. Other methods of disposing of containers are illegal and risk groundwater contamination. For liability and safety considerations, farm managers and foremen should all be knowledgeable about the handling, storage, and legal disposal of pesticides and their containers. Pesticide handlers must complete the appropriate licensing and pesticide training.

## Wellhead Protection

Poorly-constructed wellheads are a major source of groundwater contamination from fertilizers or pesticides. Good wells are grouted and sealed with concrete and, ideally, enclosed in a concrete cover with a concrete floor. Several management practices can reduce the risk of groundwater contamination regardless of well construction. No agricultural materials should be mixed at the wellhead. Hoses or faucets should provide water at a mixing area away from and preferably downhill from the wellhead. A grassy buffer at least 10 feet wide should protect the well from high traffic areas or any pesticide application areas. The well cover should be above the surrounding landscape and the immediate land should slope away from the well. If production areas are above a well, consideration should be given to the leachability of fertilizers or pesticides used.

## Summary

Christmas trees are a renewable and sustainable agricultural crop. With appropriate consideration of water quality, environmental considerations, and worker safety, problems need not occur.

## Shaping of Christmas Trees

Shaping is necessary for high-quality Christmas trees. The term “shaping” is applied to any cutting done to shape the plant to its desired appearance. This may be done by either shearing or pruning.

The term “shearing” refers to cutting back the current year’s growth of the leader and lateral limbs. Shearing reduces deformities and improves the shape of the tree.

<https://christmastrees.ces.ncsu.edu/christmastrees-christmas-tree-fertility/>

and lateral limbs. Shearing reduces deformities and improves the shape of the tree.

Pruning is the removal of injured, dead, or diseased parts or wood older than the current growth.

Since any one set of guidelines is not suitable for all trees, several species will be considered separately. Ideally a tree should resemble a cone, wide at the base and tapering uniformly to the tip. The base should be about two-thirds as wide as the tree is tall. Taper is defined as the tree width at the base divided by the tree height. Acceptable standards for a taper will range from a minimum width of 40 percent of the height to a maximum of 90 percent.

Some growers prefer to shear using knives with a 14-inch blade, although strong hedge shears and specially-designed machines can be used with success. If knives are used, they should have high-quality blades that retain a very sharp edge with minimum sharpening. Regardless of the type of tool used, personal safety is a primary concern.

## Firs and Spruces

Firs and spruces require substantially different treatments than pines. In these species, lateral buds develop along the current leader and branch growth and are not initiated from fascicles (bundles of needles found on pines). New growth may be cut any time after branch elongation is 80 percent complete until the following spring before new growth starts.

It is best to use a minimum amount of shearing and pruning so that the trees will have a natural appearance. The main thing to strive for is compactness by controlling height and lateral growth. Most growers cut the leaders in summer, although the same process may be used until late spring just before dormancy is broken. To maintain the desired cone shape, the terminal portion of lateral branches are also removed. Correct summer shearing allows for development of a denser, higher-quality tree, through growth of vegetative buds on the stem and branches.

When the trees reach 3 to 4 feet in height, bottom branches may be cut to provide a "handle," depending on what buyers expect.

## White Pine

It is important to start shearing white pine at the proper year and season. When the tree is about 12 to 24 inches in height, the terminal bud should be removed to



provide more limbs for what will be the base of the tree. This height should be adjusted upward for a tree growing on a steep slope. Shearing will stimulate production of buds and make the tree more dense and compact. The season to shear white pine is between the time the new leader completes its growth and before it "hardens." These dates vary with the growing conditions, the elevation, and the season, but is generally during the period of June to early-July.

Start shearing by cutting the leader to desired length (10 to 14 inches is usually best) at a 45-degree angle, with the face of the cut in a northerly direction to reduce drying. The side branches of the top whorl should be cut so that they are 3 to 5 inches shorter than the terminal. The side branches are then clipped to shape the tree into a cone. Overshearing should be avoided, as close-shaved trees are not the most desirable.

Shearing should be restricted to the current year's growth because older growth does not usually set buds. When the tree is about 3 feet to 4 feet high, bottom branches should be cut off so that a handle will be available when the tree is harvested.

## Virginia Pine

Guidelines for shaping Virginia pine are generally similar to those for white pine. However, because of its growth habit, Virginia pine needs to be sheared at least twice and sometimes more frequently each year.

Time of shearing can be better judged from needle growth than the calendar. A good rule is to begin shearing when new needles are one-half as long as needles from the previous flush.

Corrective shaping can usually be done at any time of the year. It is extremely important that multiple leaders be removed early in the life of the tree. Additionally "handles" should be pruned at least 2 years before harvest.

## Redcedar and Leyland Cypress

Redcedar can be sheared lightly at any time during the growing season with hedge clippers or knives. Leyland cypress should also be sheared lightly, with the best time late in the growing season.

# Ground Cover Management

Ground cover or vegetation management is essential in producing high-quality Christmas trees. Many growers have produced Christmas trees with bare ground because they were worried about ground cover competition for water, nutrients, and light. However, maintaining bare soil can lead to soil deterioration resulting in increased soil erosion, poor root growth, and poor tree quality. There are many ground covers ranging from native plants to introduced plant species which, if managed properly, can be used as a ground cover without impacting tree growth and quality.

Scouting weed species in the plantation is the first step in a ground cover management program. Information on weed identification can be obtained from various agencies, and there are many good weed identification references (see [Appendix](#)). Identifying the type, density, and location of the vegetation in the plantation is an important part of the management process.

Vegetation may be grouped into five major categories: perennial grasses, perennial broadleaves, annual grasses, annual broadleaves, and woody perennial vegetation (trees, shrubs, and vines).

Whether the vegetation occurs between the rows or within rows is also important. Competition is greatest from vegetation in the area immediately around the tree or within a row. Vegetation growing between the rows is less of a competitive threat simply because it is further from the tree.

Since perennial grasses are very competitive, growers should minimize them within rows. In addition, perennial grasses found between rows should be mechanically or chemically mowed (suppressed via low rates of post-emergence herbicides) to control competition.

While woody vegetation is not particularly competitive, it does interfere with tree work, and is easiest to control prior to planting. Since most woody vegetation is perennial with well established deep root systems, it can be particularly difficult to control. Choice of control measures and timing is critical.

Vegetation desirable for use as ground cover generally exhibits one of two useful characteristics: it is naturally less competitive, or it is reliably controlled either through mechanical or chemical mowing. Less competitive ground covers include broadleaf annuals or perennials that seldom grow tall enough to interfere with tree growth. Such species include strawberries, violets, dandelions, plantains, groundsels, and common trailing cinquefoil. Groundcovers that can and must be

suppressed because they are otherwise too competitive or interfere with shearing or harvest include clover, smartweed, wild carrot, yarrow, red sorrel, nimblewill grass, chickweed, annual grasses, and some perennial grasses.

The two principal methods for maintaining groundcover at an acceptable height between the rows are mechanical mowing and chemical application, either separately or in combination.

## **Mechanical Mowing**

Mowing is an effective way to keep competing plants under control between rows. Properly timed mowing reduces competition, rodent damage, and fire hazard. Rotary-type mowers are usually preferred for grass control, as sickle bars are particularly apt to damage or cut trees. However, mechanical mowing will favor grass species that are most competitive to trees.

Mowing alone must be repeated several times during the growing season. It should be done often enough to prevent the grasses from forming seeds that could germinate within the row. Weather greatly determines timing of the first and subsequent mowing operations. A cool, dry spring can delay the first mowing. Subsequent mowing during the growing season depends largely on the frequency and amount of rainfall and fertility of the site.

## **Chemical Application**

Herbicides are an effective substitute to mechanical mowing for controlling competition by weeds and grasses. Herbicides are generally classified as either pre-emergent or post-emergent, depending on the stage of the weeds the herbicide is designed to control.

The effectiveness of a chemical can vary from no response to a complete kill, depending on application conditions and procedures. To be effective, herbicides should be carefully selected. Several different uses of chemicals are in new plantings in a cleanly cultivated field, new plantings in a sod, or on established plantations. Response to chemicals will depend on several factors, such as size, kind and growing condition of target plants, time of application, soil composition, rainfall, temperature, rate of deterioration before being incorporated into the soil, and

persistence of the chemical. Most properly-formulated herbicides are short-lived in the environment, but still they must be carefully used to prevent long-lasting effects

by changing the composition of the plant community.

“Chemical mowing” is a term used to describe the practice of applying post-emergent herbicides at low rates to stunt or suppress weeds and grasses. This practice was developed to provide growers with a cost-effective, soil conserving alternative to broadcast application of pre-emergence herbicides or mechanical mowing. Chemical mowing can be used as a broadcast application or as a between-row treatment where trees were previously banded in the row with pre-emergence herbicides.

Chemical mowing is generally more economical than traditional mechanical mowing. The application of low rates of herbicides two or three times during the growing season is usually less expensive than maintaining mowers and paying for the labor to mow several times a season. Chemical mowing typically provides control for 6 to 8 weeks, compared to 3 to 4 weeks for mechanical mowing.

Chemical mowing also fits well with many of the strategies used in Integrated Pest Management (IPM). It is especially important to the management of white grubs. By leaving a ragged height of suppressed vegetation, May and June beetles (the adults of white grubs) are less likely to lay their eggs than they are in mechanically mowed vegetation.

It should be noted that the need for pre-emergence herbicide applications cannot be totally eliminated by chemical mowing.

WRITTEN BY



**[Dr. Jill Sidebottom](/profile/jill-sidebottom/)** *Links to: </profile/jill-sidebottom/>*

Extension Specialist (Mountain Conifer IPM)

Forestry & Environmental Resources

NC State Extension, NC State University

PAGE LAST UPDATED: 5 YEARS AGO

## YOU MIGHT ALSO LIKE

- Chapter 5 – Early Days: the 1960s
- 9. Lawns — North Carolina Extension Gardener Handbook
- Herbicide Carryover in Hay, Manure, Compost, and Grass Clippings

- **Glossary**
- **Herbicide Carryover in Hay, Manure, Compost, and Grass Clippings:**
- **Soil Testing and Interpretation of Results for Christmas Tree Plantations**

N.C. Cooperative Extension prohibits discrimination and harassment on the basis of race, color, national origin, age, sex (including pregnancy), disability, religion, sexual orientation, gender identity, and veteran status.

Information on [Accessibility](#).