Fertilization of Christmas Trees in Oklahoma

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Christmas trees, like any plant material, need nutrients to increase growth and maintain vigor. A vigorous tree usually will display enhanced color, an important factor in Christmas tree production. Proper site selection is the foremost consideration in providing a proper nutrient regime. A sandy loam, loam, or clay loam type soil with good internal drainage and good nutritional characteristics may make fertilization unnecessary.

Although fertilization holds the opportunity to increase tree growth and produce more salable Christmas trees in a shorter period of time, it also can present unforeseen problems. If not applied properly, fertilization can result in 1) spindly growth form caused by a fast growth rate, 2) increased shearing time, 3) stimulation of weeds, and/or 4) lower survival rates.

The first step in deciding whether or not to fertilize is to have a soil test done for the area to be planted. Any gross deficiencies should be corrected during site preparation. The soil test should at least include analyses for phosphorus (P), potassium (K), and pH.

If the pH is below 5.0 you may consider applying dolomitic limestone to raise the pH to approximately 5.0 to 5.5. If the pH is 6.5 or above sulfur can be added to lower the pH, but if large amounts are required it will not be economically feasible to do so. Each soil has a different buffer capacity which determines how much lime or sulfur is needed to raise or lower the pH, respectively. A more complete soil test can give you an indication of this buffer capacity. See OSU Extension Fact sheets PSS-2207, PSS-2225, and PSS-2229 for more information concerning soil sampling and OSU soil tests.

Both P and K should be applied as preplant fertilizers and incorporated across the area to be planted. It is not efficient to apply nitrogen as a preplant fertilizer due to possible losses by leaching and volatization, and because additional nitrogen can stimulate weed growth.

Fertilizers can be applied at planting time on a per tree basis. It is important not to apply the fertilizer directly in the planting hole because of the possibility of burning the roots. If granular or liquid formulations are used, it is advisable to stay at least eight inches away from the trunk the first year and then just outside the perimeter of the dripline for subsequent applications. Never place fertilizer under Christmas tree limbs. On sloping land, put fertilizer below seedlings to prevent washing of fertilizer against the root collar. Application should not exceed two ounces or three tablespoons per tree

of 12-12-12, 10-20-10, or other complete fertilizers. Slow release fertilizers packaged as tablets or spikes can also be utilized.

Postplant fertilization should be applied on a per tree basis, not broadcast on an acre basis. This will avoid stimulating weed growth between rows. Regular soil tests will help you determine the need for postplant fertilization and to determine the effects of prior fertilization. Foliar tests can also be a useful tool to monitor nutrients actually getting to the tree. After the second year, fertilizer should be applied two to four weeks prior to bud break.

Since research information is not conclusive and specific recommendations for Oklahoma Christmas tree growers have not been developed, it is recommended that growers experiment with different types and rates of fertilizer to use for their species of tree under their soil and climate conditions.

Literature Review

The following is summary information from three publications concerning fertilization of Virginia pine Christmas trees in the Southern United States.

In February 1976, a Virginia pine plantation (1-0 stock) was established on a fine sandy loam, well drained, moderately permeable soil in Louisiana. A commercial grade 8-8-8 fertilizer was applied by hand on the soil surface around each tree in

the spring of the second, third, and fourth growing seasons. The treatments included fertilizer rates of A) 1,000 lbs. per acre (0.8 lbs. per tree), B) 500 lbs. per acre (0.4 lbs. per tree), C) 250 lbs. per acre (0.2 lbs. per tree), and D) none.

Survival was 96.1 percent at the end of the first year and 95.3 percent at the end of the second year. The treatments had no measurable effects on survival (Hu and Burns, 1979). Fertilizer application at all three levels improved second year height growth (Table 1). Although the greatest height growth occurred at the highest fertilizer rate there was no significant difference between this rate (1,000 lbs./acre) and the next lower rate (500 lbs./acre).

After four growing seasons the survival rate was about 93 percent (Hu and Burns, 1980) and the trees averaged about five feet in height. Fertilized trees were only a few inches taller than unfertilized trees but appeared fuller and more attractive. Fertilization resulted in a substantial increase in the proportion of salable trees. The highest percentage of salable trees was produced with a fertilizer rate of 500 lbs. per acre.

Table 1. Effects of Fertilizer on Virginia Pine Christmas Trees.

Trt.	Fertilizer rate per acre (lbs)	Fertilizer rate per tree (lbs)	Average second-year height growth (inches)	Salable Christmas trees at 4 years (%)
A	1,000	0.8	31.8	65
B	500	0.4	30.9	70
C	250	0.2	28.9	56
D	none	none	25.6	42

Another study, established in Arkansas during January of 1980, examined the treatments of weed control, seedling source, and fertilization (Wheeler, et. al, 1987). Weeds were controlled by either chemical or mechanical means. Herbicide plots included the application of 1 lb. Atrazine and 4 lb. Simazine per acre during the first two years. Roundup was applied as needed as a post-emergent herbicide. The fertilizer treatments consisted of either no fertilizer or fertilizer applied at a rate of 100 lbs. nitrogen and 50 lbs. of phosphorous and potassium per acre. Fertilizers included ammonium nitrate and a commercial grade 13-13-13 fertilizer. The fertilizer was applied by hand in a band 1 foot from the seedling during the second spring after planting.

The response of the seedlings to fertilization in this experiment depended on whether or not herbicide was used. Although the value of both sources in the mechanical weed control treatment increased with the addition of fertilizer, the value declined in the presence of fertilizer and herbicide. The decline was caused by a greater mortality rate in the plots that received both fertilizer and herbicide.

In over two thirds of all fertilizer tests conducted in North Alabama, tree growth decreased after fertilizer application (Brown, 1988). Current recommendations are to correct deficiencies based on soil tests but to approach additional fertilization with caution. Brown reports that optimum tree growth is obtained when the following set of criteria are achieved:

1) Potassium (K) level should be greater than 120 lbs. per acre.
2) Magnesium (mg) level should be between 50 and 90 lbs. per acre.
3) The potassium/magnesium ratio should be greater than 1.5.
4) Phosphorus (P) level should be 5 lbs. per acre or greater.
5) The pH should be between 5.0 and 6.5.

Brown warns that experiments to correct deficiencies identified by the above criteria have not always produced better results. In addition, application of nitrogen fertilizer to newly planted seedlings almost always decreased growth and survival.

Summary

Further studies are needed to arrive at better recommendations for the fertilization of Virginia and Scotch pines. Growers should have their soils tested and correct any gross deficiencies during site preparation. Each soil type within each site represents a unique combination of factors and its response to fertilization may be much different from another site. Individual test plots by growers are recommended before large scale fertilization.

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