

## Coloring Christmas Trees Before Harvest

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As the Christmas tree industry develops in Virginia, the production of larger quantities of trees places growers in a more competitive environment. Under conditions of competition, it becomes necessary for growers to produce the highest quality trees possible in order to enjoy marketing success. There are many characteristics of Christmas trees which are widely considered to be quality factors, but the most important are shape, needle retention, straightness, and color.

Care in the growing and harvesting of trees can result in high quality; however, it is often not possible to control natural tree color. During the late fall, many tree species naturally lose their deep green summer color, and this can greatly reduce their marketability. This yellowing, or chlorosis, is usually caused by shorter day lengths and a reduction of the solar angle, which results in a larger amount of damaging ultraviolet light. This process of yellowing may also be aided by the natural removal of nutrients from the needles and is further enhanced by cold, dry weather. Certain tree species, such as Virginia pine, white pine, and Scotch pine, are particularly susceptible. With Scotch pine, some varieties, such as the short-needled French and Spanish strains, do not yellow as much as others. The longer needled Germanic and Baltic varieties are more susceptible. For some species, such as Fraser fir, the deep green color can be maintained by adequate levels of soil fertility. The application of nitrogen fertilizers on a regular basis is sufficient to maintain healthy trees with the desired color. Many species, however, are not so responsive to fertilizers, and for these, the most common way to maintain the desired color is to spray them with a colorant. The use of Christmas tree colorants began in 1958 in Ohio, when tests were first made by the Ohio Agricultural Experiment Station. Promising results of tests on pines, spruces, and first led to the development of a thriving colorant industry.

### Characteristics of Tree Colorants

There are a number of suppliers of tree colorants for the Christmas tree industry. Their products are generally advertised in trade journals and at trade shows and fairs.

In general, these colorants all range from blue-green to green in color and are formulated as water-soluble pigments that become permanent after drying.

Colorants are sold in liquid form and often come in 1- to 5- gallon containers. Colorants are diluted before use, with the degree of dilution depending upon how yellow the trees are. Trees that are extremely faded or yellow will require much more colorant or a lower dilution. In general, most colorant is manufactured so that a 20:1 to 30:1 water:colorant mix is suitable. One company offers a concentrated colorant that can be diluted to 50:1.

Colorants are generally classified for shipping purposes as water-extendable paints and are not dangerous chemicals. They carry the CAUTION label and have established procedures for over- exposure during application. In general, colorants are no more dangerous to use than other common household chemicals.

### Application of Colorants

Colorants are typically applied in autumn, prior to the time of natural yellowing. Trees can be colored after yellowing; however, more colorant will be needed at this time. Most growers prefer to spray their trees prior to the first fall frost, but before the trees have noticeably yellowed. If the trees are very lightly sprayed, the faded color may appear under the colorant later in the season. It is therefore necessary to spray all trees well, even though they may appear to have good color at the time of spraying.

Trees should not be sprayed when it is raining or the weather is extremely foggy or humid, or when there is water or frost on the trees. Temperatures should be at least 40 degrees Fahrenheit, and wind should be minimal. Depending upon brand, the colorant will dry in 15 to 30 minutes and will form a durable green film that will last at least one growing season after application. The first step in coloring trees is to prepare the spray mixture.

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The dilution rate depends upon the condition of the trees and the desired color, and will vary depending upon the product. It is best to follow the recommended rates at first, and then modify them to suit your own needs. Some companies produce colorant for specific tree species, and these specialized products may or may not be suitable for your situation. Some products have their greatest effectiveness when the mixing water has a pH of 7.0. Manufacturers of these products typically provide a strip of hydriion paper to check the pH of your water. The addition of 1/2 teaspoon of household ammonia per 10 gallons of water will generally raise the pH by one unit. A pH higher than 7.0 will not affect the performance of the colorant.

In order to correctly apply colorant to trees, some type of spray equipment is necessary. For small plantations or areas where the trees are close together, hand-operated backpack sprayers work best. However, for larger plantations, these are not very economical. Small backpack sprayers have only a 1- to 3-gallon tank capacity, which limits their usefulness to large growers. For medium-sized growers, the backpack moist blowers are quite effective. They spray the mixture of colorant and water on a blast of air and will cover many more trees per gallon than the hand-operated backpack sprayers. The backpack mist blowers also have a small capacity and need to be refilled every 15 minutes or so. Some larger growers have mechanized their spray operations and commonly use large tanks attached to tractors and multiple spray guns attached to the tank with hoses that may reach two to three rows from the tank. Productivity per man-hour varies depending upon the type of equipment. On the average, using backpack equipment, one worker can spray 50 to 60 trees per hour but has a difficult time sustaining that rate for a whole day. It is important to select the spray operation that best suits your needs. Some plantings may be on slopes too steep for a tractor, necessitating the use of backpack spray equipment. Spray nozzle selection is also important. If the spray tip is too small, the colorant will drift away from the tree, and if too large, the coverage will be poor. Colorant tends to clog up nozzles and spray hoses, so it is necessary to clean all equipment carefully after each use. One commercial grower sprays his tractor and other equipment with a lightweight lubricating oil prior to spraying colorant. This enables a quick, efficient cleanup by simply washing the colorant off with a jet of water. If precautions are not taken, all spray equipment, tractors, etc., will end up irreversibly green after continued use.

The total cost of the spraying operation depends upon the equipment used, labor costs, worker efficiency, and the colorant. Some average figures for Virginia are as follows:

Cost of Colorant	\$13.00 per gal
Dilution rate	29 gal water : 1 gal colorant
No. trees sprayed per 30 gal mixture	120 trees
Hourly labor wage	\$6.00 / hr
No. trees sprayed	40 trees per hr

Cost of spraying 1000 trees = 8.3 gal colorant \* \$13.00 per gal colorant + 25 hr \* \$6.00 per hr = \$258.00

Cost figures are very difficult to calculate because so many variables ultimately influence the total cost of the coloring operation. A small, part-time grower with little overhead and no labor or equipment costs may have a cost as low as \$130.00 per 1,000 trees. A large commercial grower, however, may have expensive equipment and labor with workers' compensation, unemployment, vacation, etc. This type of grower may have costs as high as \$800.00 per 1,000 trees. The efficiency of the operation, layout of the plantation, and size and condition of the trees all greatly influence the total coloring costs.

## Benefits of Using Colorants

Trees that are colored correctly have an increase in quality that will positively influence their marketability. Many growers have noticed that customers on choose-and-cut farms will often selected colored trees over uncolored trees. In fact, selective coloring can be used to improve the appearance of a lower quality tree relative to its uncolored, but better formed, neighbors. Such trees are often selected by buyers based on color alone.

Although it is not desirable to color trees that are not sold, the colorant will not affect growth of the tree during the next growing season. While the color may last during the next harvest season, the new growth will be subject to fading and yellowing. This may necessitate re-coloring the tree.

With an increasingly competitive market, the need to color Christmas trees will increase in Virginia. Growers are often hesitant to invest in new equipment and a new, time-consuming cultural practice. However, competition may dictate that only colored trees will be marketable in the future.