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FOREST PRODUCTS LABORATORY
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TREATING SPRUCE AND BALSAM FIR CHRISTMAS TREES TO REDUCE FIRE HAZARD

After trying various chemical treatments suggested for making spruce and balsam fir Christmas trees less inflammable, the Forest Products Laboratory has concluded that keeping the tree standing in water is about the most practical, satisfactory, and convenient method of those tried that will keep the fire hazard low and prevent needles from discoloring or falling. The procedure recommended is as follows:

1. Buy a tree that has been cut as recently as possible.

2. Cut off the end of the trunk diagonally at least 1 inch above the original cut end. Stand the tree at once in a container of water and keep the water level above the cut surface during the entire time that the tree is in the house. If the tree is not to be set up for several days, it should be kept standing in water meanwhile in a cool place.

If started in time, this treatment not only prevents the needles from drying out and becoming inflammable, but it will also keep them fresh and green and retard the fall of needles of such species as spruce, which loses needles very easily in contrast to balsam fir which retains its needles even after the branches have become dry and the needles brittle. Freshly cut spruce or balsam fir trees standing in water cannot be set on fire by candle or match fires, but, of course, cannot withstand a large source of heat.

Regardless of treatment, all possible precautions against fire, should be in effect around the

Christmas tree, including the elimination of defective electrical connections, and avoidance of the accumulation of combustible decorations on or beneath the tree; the tree should be placed so that its accidental burning would not ignite curtains or other combustible furnishings nor trap the occupants of a room or building.

The above observations on water vs. chemical treatment of Christmas trees were made during tests in which spruce and balsam fir branches were allowed to take up water and solutions of ammonium sulfate,¹ ammonium phosphate, ammonium sulfamate, and calcium chloride.¹ It is probable that the effect of a water treatment on other species would be similar to the effect on spruce and balsam fir, but other species may or may not react similarly to treatment with chemical solutions.

With respect to the chemical treatments tested, a general observation, which may be applicable in the case of other chemical treatments, may be pertinent. It was observed that the chemical solutions were neither taken up so rapidly nor in such large amounts as was water, and the trees lost weight while being treated. In other words, while they were taking up fire-retardant chemical they were losing another excellent fire retardant, water. In general, the more concentrated the chemical solution, the less the rate of absorption.

¹Solutions of these chemicals are recommended in Department of Agriculture Leaflet 193, "Fireproofing of Christmas Trees." The Bureau of Agricultural Chemistry and Engineering, Washington, D. C., states that their findings, based on tests on small trees of eastern redcedar (*Juniperus virginiana*) and Virginia pine (*Pinus virginiana*) indicate that these species are more susceptible to treatment with solutions of ammonium sulfate and calcium chloride than trees of spruce and balsam fir.

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A summary of results of treatments of spruce and balsam fir with solutions of various concentrations of ammonium sulfate, ammonium phosphate (both mono- and diammonium phosphates and a mixture of both), calcium chloride, and ammonium sulfamate is as follows:

Ammonium sulfate.--Caused serious discoloration of both spruce and balsam fir needles. Needles started to fall 2 days after treatment and by 4 or 5 days were falling freely. Treated spruce specimens decidedly more inflammable than water-treated specimens. Balsam fir specimens not so inflammable as the spruce, but not significantly less inflammable than water-treated specimens.

Ammonium phosphates.--Results similar to those obtained with ammonium sulfate.

Calcium chloride.--Needle color and fall not seriously affected. Fire resistance of specimens treated with 40 percent solution less than that of water-treated material. Fire resistance of material treated with 20 percent solution comparable but not superior to water-treated.

Ammonium sulfamate.--Caused needle discoloration, but no needle fall although needles became brittle and were easily loosened by handling. Fire resistance of material treated with 40 percent solution approximately equal to water-treated controls. Considerable fire retardance after specimens were allowed to dry.

Although these experiments with materials of known fire retarding possibilities failed to disclose a chemical treating material superior to water, they do not prove that such treatment is impossible. Until some other treatment for spruce and balsam fir is proven to be substantially superior, water, if used under the conditions specified, will serve well at little cost.