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## A NOTE ON AXIS RESTORATION IN A GYMNOSPERM TREE

ROBERT B. WYLIE

Injury to the major axis of a tree with excurrent growth often results in the development of a dwarfed or unsymmetrical crown. In the case of certain gymnosperms the lost apical shoot can be restored by bending upward one of the adjacent lateral branches and fastening it in upright position. In this way it may be induced to develop into a radical, lead shoot and dominate the further growth of the tree. While this practice is fairly well known it should occasionally be brought to the attention of the general public. The following paragraphs record another instance of the successful substitution of a lateral branch for the lost apical shoot of an injured pine tree.

The tree, a white pine (*Pinus Strobus*), had been transplanted, when "three or four years of age," from Michigan to a lawn in Iowa City. It stood near the north east corner of a large residence which cut off some of the direct sunlight early afternoon. It was also shadowed earlier and later in the day by taller trees on adjacent lots. The transplanted pine had made a normal growth and was about 16 years of age at the time of the accidental destruction of the apical shoot during the late summer of 1934.

Early that autumn a lateral branch about 2 feet long was bent upward and fastened rather loosely to a stick perhaps four feet long which had been firmly tied to the main stem below at two or three levels. Through a number of months the bands holding the upturned branch to the splint were gradually tightened, thus bringing it more closely to the support, but there remained a considerable arch at its base. After two years' growth and the tree had a fairly hopeful appearance, the splint was removed. The substitute, terminal shoot had developed radial symmetry and was already appreciably larger than its sister branches. A few years later, when this pine was dangerously loaded with ice, all branches except the new apical shoot were bent to the ground but it stood erect carrying its ice load without bending except at the tip.

In March 1942 the base of the upturned branch was  $2\frac{3}{4}$  inches in diameter while the four other members of its original whorl

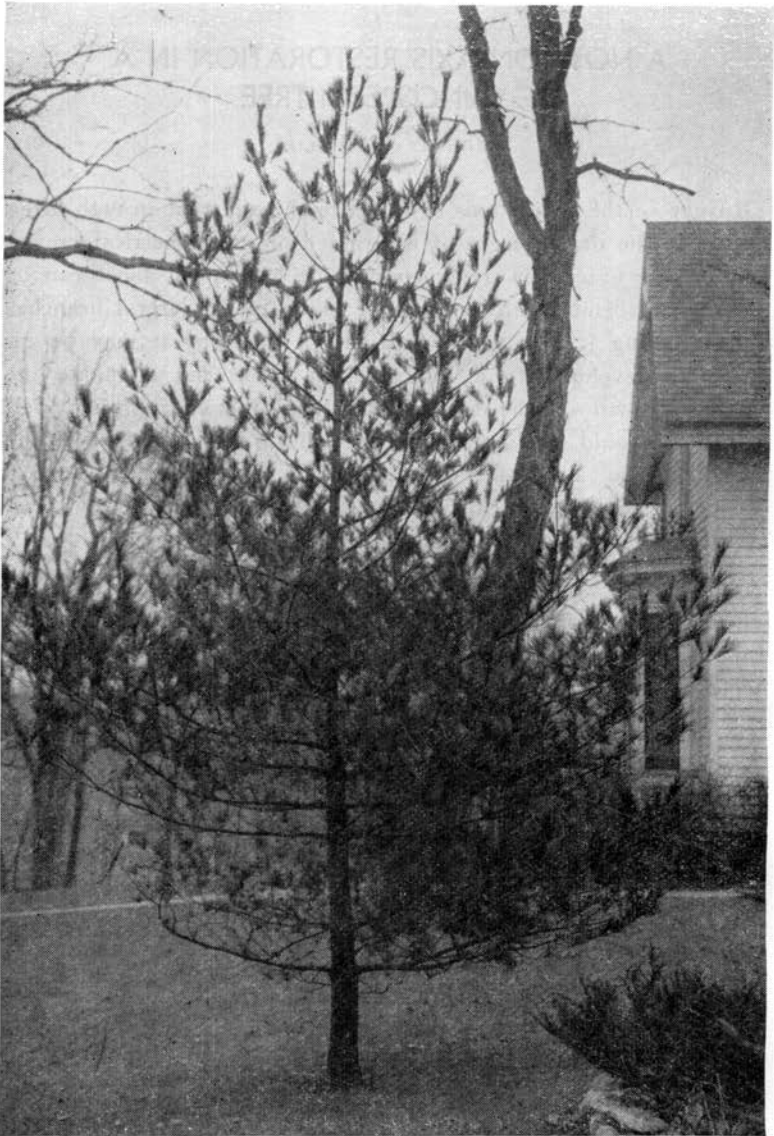


FIG. I

White pine tree, now twenty-four years old. The apical shoot was broken out in 1934; a lateral branch was then raised up and fastened in vertical position. This branch soon developed radial symmetry and dominated the further growth of the tree. A slight angle in the axis indicates the base of the new apical shoot. The picture, taken March 1942, shows the present form of the tree after seven years of renewed growth.

averaged about 1 inch in thickness. The cross sectional area of the new apical shoot was therefore nearly twice the combined cross sectional areas of the sister branches, measured at their common node. Meanwhile the curve near the base of the upturned branch had disappeared and the tree to the casual observer is a normal white pine.

Inspection from certain angles of course reveals the modified habit of this tree. There is a pronounced narrowing of the crown in the region of operation. This is due in part to the dwarfing of the lateral branches of the first and second whorls on the substitute axis, and also in part to the rapid growth of the sister branches during the "interregnum". Since at the present time adjacent branches both above and below the dwarfed whorls are growing rapidly, they will soon round out the top.

The newer portion of the axis is not quite in line with the lower part but the upper is more nearly vertical. It seems likely that this has been due in part to growth adjustments at the base and partly to the fact that the tree is emerging from the shadow of the nearby house. An accompanying figure shows the pine at this date, now approximately 24 years old, and after 7 years of renewed apical growth.

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