

USING TREE SHAKERS FOR PINE CONE COLLECTION IN REGION 8

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In May 1966, a tree shaker was observed thinning peaches near Fort Valley, Ga. This observation led to an adaptation of the tree shaker in collecting pine cone in Region 8.

There are numerous commercial tree shakers on the market; and basically, they are of two types: 1. A limb shaker, and 2. a bole or trunk shaker. We chose the bole shaker for its speed and ease of operation.

Since we collect cones from seed production areas, we used a commercial model of tree shaker, as is used in pecan orchards. The shaker is mounted on a 7,000 GVW short wheelbase truck chassis, equipped with an automatic transmission (fig. 1). The hydraulic power steering system is reversed to allow operation of the vehicle while operator is facing the rear. The rear tires are high flotation, low profile tires for use in unstable soil conditions. The shaker boom is mounted over the rear axle of the unit and operates off the rear of the unit.

The tree shaker has a padded clamping device mounted on the extreme end of an 18-foot boom,

capable of clamping the bole of a tree up to 36 inches in diameter (fig. 2). A shake pattern is developed by counter-rotating unbalanced weights in the shaker head. The rotation can be controlled to produce vibrations varying in frequency from 400 to 4,000 c.p.m. The shaker is operated by a hydraulic motor of a vane type. The hydraulic pump is driven by the truck engine.

In operation, the tree is clamped at 8 to 10 feet above the ground and one or two 15-second shakes are sufficient to remove the majority of the cones from slash pine and longleaf pine (fig. 1). Additional shake periods are needed for shortleaf and loblolly pine.

In a seed production area, 25 to 30 trees can be shaken per hour. The number of trees shaken, trees damaged, and cones removed are dependent on tree species and the skill of the operator. The vehicle is capable of traveling at speeds of 15-20 m.p.h. across country with the boom in shake position. The boom can be folded back over the vehicle and towed behind a 1 1/2-ton truck for long distance moves.



Figure 1.—Side view showing tree shaker position for shaking the tree.



Figure 2.—View showing the padded clamping device in the open position.

We used the tree shaker on longleaf, slash, loblolly, and shortleaf pines. The percent of cone yields, bark damage to bole, and top breakage varied for each species. On slash pine, a 15-second shake would release 80 percent of the cones without damage to the trunk, top breakage, or excessive removal of small green minor branches. Longleaf pine cones were moderately difficult to shake off, and we estimated 50 to 60 percent of the cones were removed without tree damage. Loblolly and shortleaf pine cones were more difficult to remove. Even after prolonged shaking, only 25 to 30 percent of the cones were removed. This prolonged shaking causes bark rupture and 2 to 3 feet of top breakage.

The cone removal percentages by species were similar in 1967 and 1968 collections to that in 1966. The poor yields from loblolly and shortleaf pines are disappointing. Further machine modifications are needed to accomplish our goal of harvesting at least 70 percent of the crop without damage to the tree. This is approximately the percent of cone removal a man achieves when climbing. The Orchard

Machinery Company has modified its shaker and tested it on loblolly and shortleaf pine in the fall of 1969. Another important study currently in progress is the development of a cone loosening

agent. Successful development of either of the two above methods will be a major breakthrough in cone collection.

The tree shaker has performed satisfactorily on red oak and black cherry. We can assume that the shaker would perform satisfactorily on walnut and oaks other than red.

Other uses of the tree shaker are removal of dead branches in recreation areas and of snow and ice in orchards.

A 10-minute movie of the tree shaker is available from the USDA Forest Service, Division of I&E, Suite 800, 1720 Peachtree Rd., N.W., Atlanta, Ga. 30309.