FOREST RESEARCH NOTES

NORTHEASTERN FOREST EXPERIMENT STATION 3.8

Upper Darby, Pennsylvania

No. 48
1955

A Dual-Nozzle System For Mist Blowers

One of the most serious problems in spraying trees to control insects and diseases has been to obtain a sufficient deposit in the upper parts of tall trees.

A wide spray stream of fine droplets (35 to 45 microns in diameter) is ideal for treating the lower parts of the tree. However, by the time the air stream reaches the tops of tall trees, its speed has so diminished that not enough of the small droplets hit and stick. Larger drops (60 to 80 microns in diameter) are needed to get the spray deposited on the upper tree bark and foliage.

This problem has been at least partly remedied by using a dual-nozzle system (fig. 1). With this, the lower portion of the tree near the mist blower can be treated with a fine spray, which gets maximum coverage yet does a minimum of damage to the foliage; and the upper portion of the tree crown can be treated with a coarser spray.

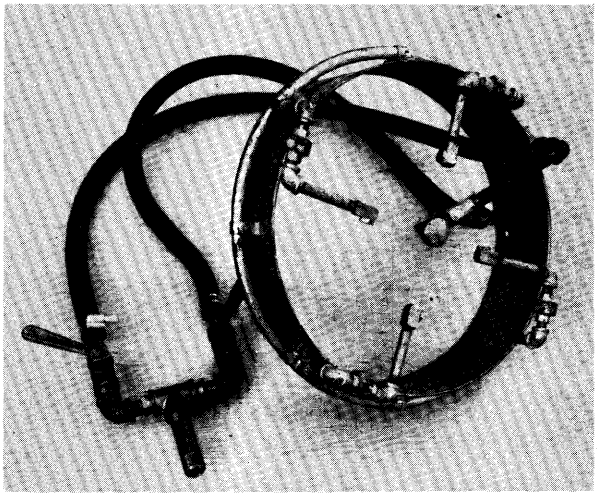

Figure 1

A dual-nozzle spray system. The coarse solid-stream nozzle is in the center. Notice the ring of 4 fine-spray atomizing nozzles set at right angles to the air blast. Two separate shut-off valves are used.

Use of a coarse-spray nozzle is limited by the range in air velocity and volume. This determines the orifice size, pressure, and type of nozzle to install. If velocity and volume are too low, the large drops will fall out of the air stream too quickly. On the other hand, if the velocity is above 125 m.p.h., provision must be made for preventing too fine atomization by the shearing action of the air stream.

For the high-velocity rigs, it is necessary to use a coarsely atomizing nozzle. This can be either a cone type such as whirljet No. 5 or No. 10, or a solid-stream nozzle with three 1/16-inch orifices, such as the one shown in figure 1. Spray streams from the orifices should leave the nozzle at an angle of about 35 degrees from the line of the air blast. If the angle is too great the spray may break out of the air stream.

The coarse nozzle should be located in the center of the outlet and pointed with the air blast. The pump pressure should be kept under 60 pounds. The output of this nozzle should be about the same as the combined output of the ring of finely atomizing nozzles.

The two sets of nozzles are not used at the same time. Therefore, to spray with one set of nozzles at a time, two shut-off valves are used, one for each system. The operator simply uses one quick-acting off-and-on valve to turn the spray on and off for the ring of fine nozzles, and another similar valve to turn the coarse spray nozzle on and off. A more simple method for operating the two nozzle systems would be to install a three-way valve that can be operated with a single lever. Several valve and sprayer companies have this type of valve in stock.

Machines that deliver 95 to 110 m.p.h. air velocity at 17,000 to 24,000 c.f.m. of air are well suited for carrying the large droplets to the tops of tall trees. With this system it has been possible to practically double the quantity of chemical deposited at the top of tall trees. This has been determined from samples taken at 5-foot intervals from the ground to the top of a 70-foot elm tree.

--S. F. POTTS

Forest Insect and Disease Laboratory
Northeastern Forest Experiment Station
Forest Service, U.S. Dept. Agriculture
New Haven, Connecticut
