

Occasional Report-15

January 1963



**BACK PACK
MIST BLOWER
STUDY**

 **Virginia Division of Forestry** 
Department of Conservation and Economic Development

BACK PACK MIST BLOWER STUDY

RESULTS OF USING A BACK-PACK MIST BLOWER TO RELEASE PINE SEEDLINGS

By T. A. Dierauf

Summary and Conclusions

1. Foliage spraying using a back pack mist blower was generally effective in releasing established pine seedlings from hardwood competition where the hardwoods did not exceed 20 feet in height. Damage to pine seedlings was negligible, even to newly planted seedlings.

2. Approximately five gallons of spray mixture were applied per acre. A per-acre mixture containing approximately two pounds acid equivalent of 2,4,5-T (½-gallon), 1 gallon of fuel oil or kerosene, and 3½ gallons of water gave satisfactory hardwood control.

3. Spraying from lines 40 feet apart gave satisfactory hardwood control where the tree and sprout density did not exceed 4,500 hardwoods per acre.

4. Spraying during the first half of August gave almost as good hardwood control as did June spraying in these 1961 spray trials. However, where dense brush or a preponderance of difficult-to-kill species occurs, June spraying would be advisable.

5. Hardwood species varied considerably in their susceptibility to the foliage spray, and in the amount of serious sprouting. In general resprouting was not a problem on these plots—where the objective was to release established pine seedlings.

Introduction

During the spring and summer of 1961 a back pack mist blower¹ was used in a number of spraying trials to release pine seedlings from hardwood competition. During the late summer of 1961, 32 of these trial plots were examined and evaluated by the Virginia Division of Forestry. These plots were scattered throughout the Piedmont and Coastal Plain in Virginia.

Locating and Installing the Spray Plots

Plots were located in areas where sufficient pine seedlings were present for an adequate stand, but competing hardwood brush was a problem. Loblolly pine was present on all the plots, with Virginia pine and shortleaf pine also present on many of the plots. Most of the plots were from 1 to 2 acres in size, but several were larger.

The first plot was sprayed on June 10, 1961, and the last on August 15, 1961. Spraying was done along pre-marked (and in some cases chopped) lines spaced approximately 40' apart. Each line was traveled twice, spraying to one side going out and to the other side coming back. Pre-tests indicated that satisfactory horizontal coverage would be obtained for a distance of at least 20', and that an overlapping of coverage would be obtained using spray lines 40' apart. Effective height coverage was found to be approximately 20 feet.



¹Schefenacker "Jim Gem Bak-Pak".

Spray Formulations Used

The most commonly used spray mixture applied per acre was:

½ gallon 2,4,5-T²
1 gallon fuel oil or kerosene
3½ gallons water

Total 5 gallons

Spray mixtures used which varied from the above involved slightly different proportions of 2,4,5-T, oil, and water. The mixing procedure was to first mix together the 2,4,5-T and oil, and then add them to the water.

Evaluating the Spray Plots

Plot data were gathered along continuous strips, 6.6 feet wide laid out across each plot perpendicular to the direction of the spray lines. These strips were well distributed over the entire area.

All hardwoods and pine seedlings occurring on the sampling strips were tallied. The pine seedlings were tallied according to whether or not they were free-to-grow and the hardwoods were tallied as to:

1. *Height class:* 2 to 12 feet, 12 to 24 feet, and over 24 feet.
2. *Percent defoliation:* 80 percent or more, 50 to 80 percent, 20 to 50 percent, and less than 20 percent defoliated.
3. *Serious sprouting following spraying:* all trees on which sprouting from the ground line or along the stem was vigorous and judged to be serious.

Percent Present defoliation refers to the proportion of the original crown (present at time of spraying) killed by the spray. A tree 50-80 percent defoliated had between 50 and 80 percent of its crown killed by the spray. Subsequent sprouting frequently occurred, but this was tallied separately and did not affect the estimate of percent defoliation of the original crown.

Effect of the Spray on Pine Seedlings

No serious damage occurred to pine seedlings (including loblolly, shortleaf, and Virginia pine) on any of the plots.

The pine seedlings on the plots ranged in height from less than a foot (six of the plots had been planted during the 1960-61 season) to over 10 feet tall (the seedlings on some of the plots had been planted as long as five years before the spraying was done).

² The chemical used was a low volatile ester of 2,4,5-T containing 4 pounds acid equivalent per gallon.

Seedlings over 4 feet in height received the most damage, and severely damaged seedlings were most numerous near the spray lines where a direct blast occurred. Small seedlings, including those recently planted, sustained very little damage.

Effect of Brush Density on Spray Effectiveness

Density varied on the plots sprayed from 1300 hardwood trees and sprout clumps (over 2' tall) per acre up to 9,500 per acre. Good hardwood kill resulted from the spraying on all plots with densities of less than 4500 hardwood trees and sprout clumps per acre. However, on denser plots there was often a very noticeable difference in the effectiveness of the spray close to the spray lines and midway between spray lines. Within the denser plots much of the spray was intercepted by trees closer to the spray lines so that trees further from the spray lines did not receive good coverage. As a result, the percent defoliation was considerably less midway between spray lines. Eleven of the 32 plots exceeded 4500 hardwood trees and sprout clumps per acre. On eight of these eleven plots overall hardwood kill or control was not satisfactory. It is thought that a shorter distance between spray lines would have eliminated this problem and given better hardwood control.

Upper Limit of Spray Effectiveness

The mist blower provided satisfactory control of most hardwoods up to approximately 20 feet in height. Some trees more than 20 feet in height were killed—especially the easy-to-kill species. In some instances trees 45' in height were killed, but kill or control obtained of trees more than 20 feet in height was not consistent. In general, trees over 20 feet tall were not satisfactorily controlled.



Effect of Season on Spray Effectiveness

The first plot was sprayed on June 10, 1961, and the last on August 15, 1961. Nine plots were sprayed in June, sixteen in July, and seven in August. There were

no important differences when comparing the three months for effectiveness of the spraying. However, the kill or control obtained as a result of June spraying was somewhat better than for August sprayings for the hard-to-kill species.

Effectiveness of the Spray on Different Hardwood Species.

Table 1—Summary, Plot¹ Defoliation Data

<i>Species</i>	<i>Number of Trees and Sprout Clumps Evaluated</i>	<i>50% or more Defoliated (Percent)</i>	<i>80% or more Defoliated (Percent)</i>	<i>Trees and sprout clumps more than 50% defoliated which sprouted seriously following spraying (Percent)</i>
Sassafras	303	98	98	8
Yellow Poplar	79	97	89	26
Sweet Gum	907	93	88	2
Sourwood	101	93	88	14
Black Gum	896	92	90	2
Persimmon	59	92	85	18
Wax Myrtle	517	91	88	0
Hickory	343	84	74	3
White Oak & Post Oak	478	79	63	2
Red Oak & Black Oak	864	67	51	4
Chestnut Oak	175	67	42	15
Wild Cherry	99	58	37	37
Holly	311	57	36	0
Dogwood	461	55	33	12
Red Maple	783	53	32	16
Pin Oak, Water Oak & Willow Oak	359	46	35	0
Mt. Laurel	95	44	16	0
Total	6,830			

¹ Based on 24 plots and omitting 8 plots on which the spray lines were judged too far apart for effective hardwood control.

Defoliation of over 50 percent generally provided satisfactory control of hardwoods. In the majority of cases pine seedlings were found to have been released where overtopping hardwoods were over 50 percent defoliated.

Defoliation of less than 50 percent generally did not give satisfactory control of hardwoods. Trees less than 50 percent defoliated are still serious competitors in most cases because they usually recover and resume growth quickly. However, in some cases defoliation of only 20 percent to 50 percent may be sufficient to release pine

seedlings. For example, where pine seedlings are only slightly less in height than the overtopping hardwoods, defoliation of only 20 to 50 percent may be sufficient to release them.

Information was obtained on many other species which are not included in *Table #1*, because the data was limited. On the basis of this limited data the following tentative ratings for some of these other species are given below.

Difficulty of Control

<i>Easy</i>	<i>Intermediate</i>	<i>Hard</i>
Black Locust	Elm	Hawthorn
Hercules Club	Hornbeam	Cedar
Alder	Chinquapin	Ash
Hazelnut		River Birch
Elder		Black haw viburnum
Spicebush		Arrowwood viburnum
Sumac		Beech
		Shadbush
		Redbud

In addition, general observations were made of the effectiveness of the spray on several other species. Grape vines and blackberry bushes were easily killed, while huckleberry and blueberry bushes were difficult to kill.

Sprouting Following Spraying

Sprouting following spraying generally was not considered serious even though many of the hardwoods that were

more than 50 percent defoliated did sprout. In most cases, the sprouting was not vigorous enough to seriously compete with established pine seedlings.

Frequently the sprouts had deformed leaves indicating residual action and effect of the 2,4,5-T. Grouping all species, only about 5 percent of all stems and sprout clumps that were defoliated 50 percent or more showed serious sprouting. For sprouting results see *Table # 1*.

Effectiveness of the Spray in Releasing Pine Seedlings

Most of the plots now support adequate stands of free-to-grow pine seedlings. A "free-to-grow" seedling is one which is now free-to-grow from overtopping hardwoods, or is judged capable of outgrowing competing hardwoods. The average number of free-to-grow pine seedlings per acre on the 32 plots is now 480 out of a total of 520 well distributed seedlings per acre. Before spraying, approximately half this total stocking was not free-to-grow.