

Recovery of herbicide damaged eastern white pine

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Mistblower applications of 2.4 pounds of 2,4,5-T acid in 6 gallons of fuel oil/water per acre were effective in releasing 3-4-year old white pine from a dense stand of blackberries, greenbriers, and hardwood sprouts.

In mid-August 1969 and 1970, we treated a white pine plantation with

2,1,5-T to reduce a dense stand of blackberries, greenbriers, and hardwood sprouts that were slowing pine growth. A mistblower was used to apply 2.4 pounds of 2,4,5-T acid in 6 gallons of fuel oil-water mixture per acre. The pines were planted in 1968 on the Fernow Experimental Forest near Parsons, West Virginia, to compare the growth of white pines originating from 98 southern Appalachian seed sources. Each source was repre-

sented by four trees in each of seven blocks.

The herbicide was effective in killing much of the competing vegetation, but it also killed about 3 percent of the white pine (*Pinus strobus L.*) seedlings and damaged terminal leaders and needles on several hundred other seedlings. Three years after treatment, mortality of damaged seedlings was negligible; and most of the seedlings had recovered and were making good growth.

The Study

We examined the plantation in November 1970 and found that seedling damage could be classified as shown below:

Damage class	Description
I	Lammas shoots badly deformed

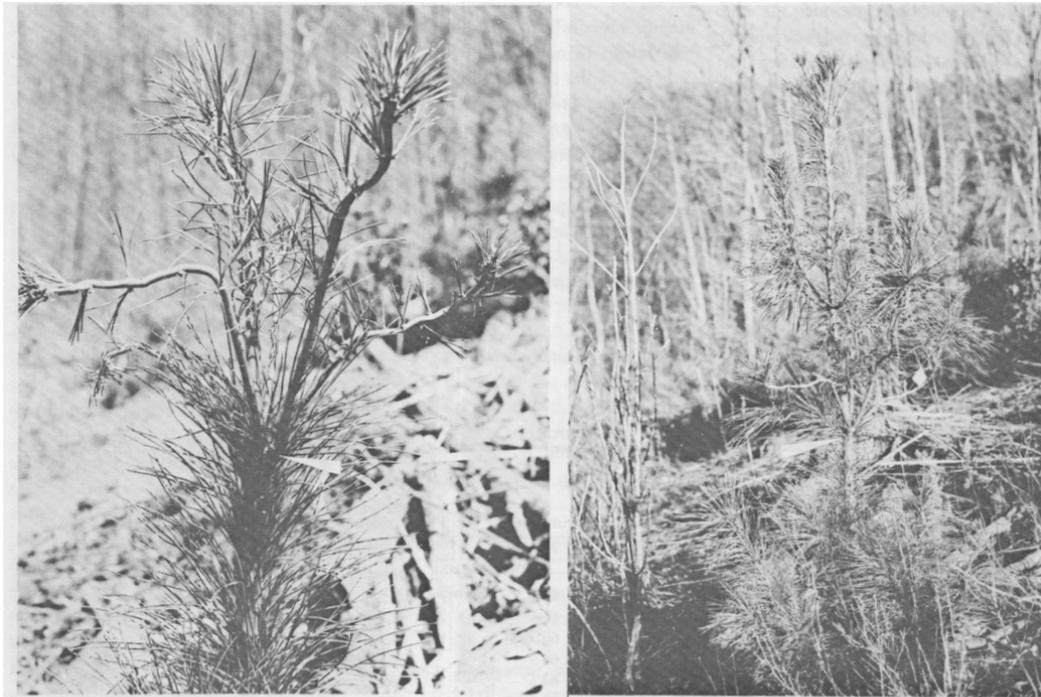


Figure 1.—Damage class I. *LEFT*, lammas growth on this eastern white pine was badly damaged at the beginning of the 1971 growing season. *RIGHT*, the same seedling at the end of the 1971 growing season. Notice the growth recovery above the point of injury.

or nearly dead; many needle clusters yellowed. (A lammas shoot is a young leafy shoot usually produced in late summer from a bud that would normally open the following spring.)

- 2 Non-lammas leaders nearly dead; terminal buds dead; needle cluster around buds yellowed or brown.
- 3 Several to many needle clusters surrounding terminal or lateral shoots yellowed or browned.

One hundred seedlings in each damage class and 100 undamaged seedlings were selected for study in the 7-acre plantation (figures 1, 2, and 3). Survival and height growth were recorded at the end of the first and third growing season after treatment.

Results and Discussion

An application of 2,4,5-T with a

mistblower, at a rate of 2.4 pounds acid per acre in 6 gallons of oilwater solution, proved to be an effective method for releasing eastern white pines 2 to 3 years after outplanting. The growth of greenbriers and blackberries was significantly curtailed, and many hardwood sprout clumps were eliminated. Three growing seasons after treatment, an estimated 90 to 95 percent of the pines were in a free-to-grow position.

About 3 percent of the pines were killed by the two herbicide treatments, and several hundred seedlings sustained various degrees of damage. Three of the damaged seedlings died during the 3 years after treatment, but the rest of the trees recovered within a year and regained a healthy and vigorous appearance.

At the end of the first growing

season after treatment, 7 percent of the leaders on class-1 seedlings and 19 percent of the leaders on class-2 seedlings were dead (table 1). However, 2 years later, lateral branches had assumed dominance on all trees that had had terminal leader damage.

The first year after treatment, height growth on the trees in classes 1 and 2 was much less than on trees in the other 2 classes (table 1). By the end of the third growing season after treatment, there was hardly any difference in average annual height growth among seedlings in classes 1 and 3 and the undamaged seedlings. Seedlings in class 2 were the most severely damaged. They did not respond as well as other seedlings the first year after treatment, but in the second and third years growth was excellent; and it is

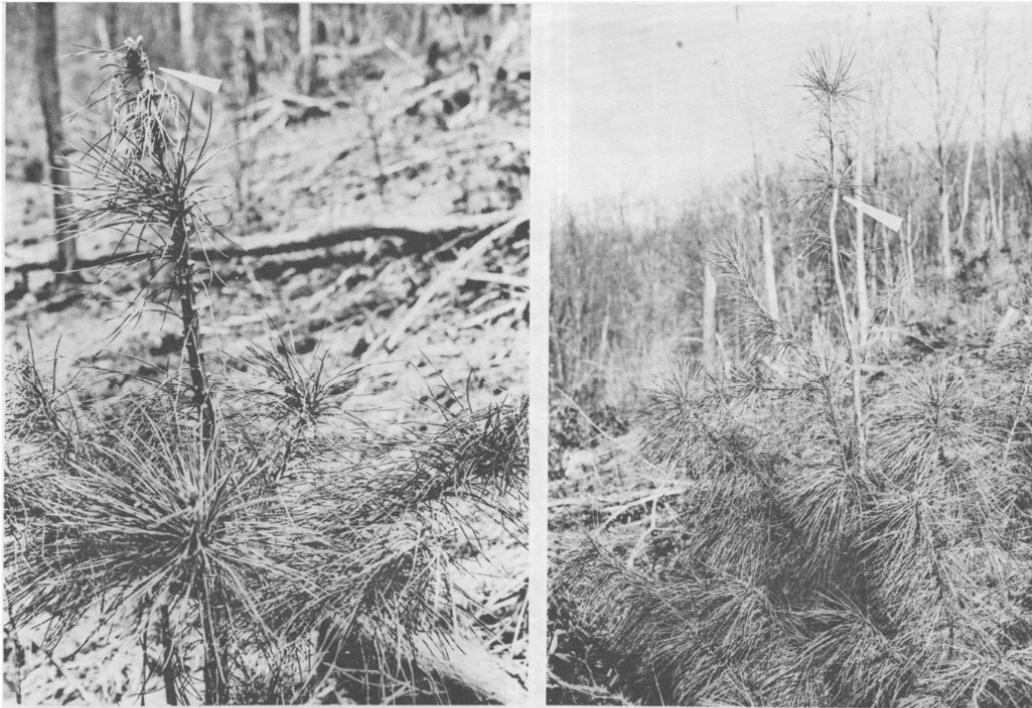


Figure 2.—Damage class 2. *LEFT*, the terminal bud and leader were nearly dead, the needles yellowed and dying, at the end of the 1971 growing season. *RIGHT*, the same seedling at the end of the 1972 growing season.

expected that future growth will equal that in the other classes.

The results of this study show that 2,4,5-T applied at the rates used in this study is an effective way to release 2- to 3-year-old planted white pines. A small percentage of pines were killed outright by the herbicide, but most of the seedlings with severe leader and needles damage recovered.

Mid-August is a favorable time for treatment because at that time foliage on competing vegetation is fully grown, and white pine growth has usually hardened off. If lammas shoots are prevalent on a large number of pines, treatment should be delayed until growth has stopped.

For treating, we recommend that the mistblower nozzle be elevated

slightly so that the pines are free from direct blasts of herbicide. If paths are flagged ahead of the mistblower, fewer white pines will be stepped on and broken off.

Because the work was done in connection with a research study, our treatment time of 3.6 man-hours per acre was probably high. We think that application time could be reduced by a third on an operational job.

Table 1.—Height growth and condition of herbicide-damaged seedlings at the end of the first and third growing seasons after treatment

Damage class	Seedlings	Dead		Terminal leader dead		Average annual height growth	
		1971	1973	1971	1973	1971	1973
	<i>No.</i>		<i>Percent</i>			<i>Feet</i>	
1	100	1	0	7	0	1.20	1.80
2	100	2	0	19	0	.81	1.58
3	100	0	0	0	0	1.40	1.79
Undamaged	100	0	0	0	0	1.47	1.83



Figure 3.—Damage class 3. LEFT, several to many of the needle clusters surrounding the terminal or lateral shoots were yellowed or browned at the beginning of the 1971 growing season. RIGHT, the same seedling at the end of the 1971 growing season.