Survival of Loblolly Pine Seedlings Planted on Areas Fall-Sprayed With Soil-Active Herbicides

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Results of two studies simulating site preparation by fallspraying with soil-active herbicides are presented. None of the treatments affected survival or growth of loblolly pine (Pinus taeda *L.) seedlings planted 2 months after spraying.* Tree Planters' Notes 39(2):10-12; 1987

Site preparation with herbicides before planting of pine seedlings has traditionally been accomplished during the spring and early summer. Kidd and others (1, 2) reported that fall applications may be a desirable alternative to treatments earlier in the year. They suggested several advantages of fall treatments: (1) fall spraying can prevent the possibility of a year's delay in treatment and planting due to wet conditions that would impede logging in time for spring treatments; (2) where sensitive agricultural crops or gardens are located near treatment areas, fewer susceptible plants are present during the fall; and (3) more herbicide applicators are available in the fall than in the spring. Finally, these researchers obtained excellent results with fall applications of picloram (Tordon) and triclopyr (Garlon).

Applying soil-active herbicides in the fall for site preparation raises the question of whether residual chemicals will kill pine seedlings planted the following winter. Two experiments were installed in southeast Arkansas to answer this question.

Methods and Study Areas

Experiment 1. An area on the school forest at the University of Arkansas at Monticello was mowed in preparation for the study. The area is level, and the soil is Henry silt loam (Typic Fragiaqualf). This poorly drained soil has a strong fragipan within 18 to 24 inches of the surface that impedes percolation of water. A pine plantation on the area had been clearcut 2 years earlier, and the principal vegetation consisted of tufts of broomsedge *(Andropogon virginicus* Thus, there was little vegetation on the area to intercept the spray.

Following mowing, twenty-one 20-by 20-foot-square plots were outlined with a string. The seven treatments listed in table 1 were applied to the plots on October 25, 1982. (Each of these chemicals exhibits varying degrees of soil activity.) The measured amounts of herbicide were applied on each plot with a backpack sprayer in enough water to equal 1 gallon of spray material, or at the rate of 110 gallons per acre. Each treatment was replicated three times.

On December 15, 51 days after treatment, 25 loblolly pine *(Pinus taeda* L.) seedlings were handplanted on each plot. The combination of late spraying and early planting provided for a "worst possible" scenario. Heavy rains between the time of spraying and planting resulted in flooding of the low-lying, flat area. Water was standing in depressions on the plots when the seedlings were planted. The soil was saturated until late the following spring, but there was no evidence of movement of herbicides off the plots, as evidenced by the sharp delineation of grass kill.

Survival and heights of seedlings were measured in the late fall of 1983 after one growing season and evaluated by ANOV, with differences being tested for significance at the 0.05 level.

Experiment 2. Because of the extensive flooding encountered in experiment 1, a second study was installed on an area with better drainage, having a gentle slope, on the Crossett Experimental Forest during the fall of 1983. The soil there is Bude silt loam (Glossaquic Fragiudalf), having a week fragipan at 26 to 30 inches. Plots were on a mowed area that consisted primarily of carpetgrass *(Axonopus affinis).* The area was disked to expose mineral soil immediately before treatment.

Plot layout, spraying, and planting procedures were the same as in experiment 1, except that additional treatments were added as listed in table 2. The plots were treated on October 25, 1983, and seedlings were planted 72 days later, on January 5, 1984. Inclement weather and frozen soil prevented earlier planting. Heights of all seedlings were measured immediately after planting and averaged 0.8 foot. First-year height growth and survival were measured after one growing season, on February 22, 1985, and subjected to ANOV, with differences being tested for significance at the 0.05 level.

Results

Experiment 1. There were no significant differences among treatments in percentage of survival or seedling heights. Survival averaged 82% (table 1), which was surprisingly high in view of the extended period of flooding during the winter and spring. Water was still standing on the plots on June 23. Seedling heights averaged only 1.0 foot a year after planting. This low figure was undoubtedly the result of flooding rather than any treatment effect. Seedling heights were not measured at the time of planting, but seedlings were quite uniform, averaging about 9 inches in height. Thus, height growth was only about 3 inches during the first year.

Experiment 2. Survival and height growth were good on all plots, and there were no significant differences due to treatment effects. Survival ranged from 88 to 97% and averaged 92% (table 2). There was no evidence of herbicide toxicity for any of the treatments. Height growth during the first year ranged from 1.1 to 1.3 feet and averaged 1.2 feet. After 1 year in the field, seedlings averaged 2 feet in height and 0.4 inch in diameter near the groundline.

Table 1—*Survival and first-year heights of loblolly pine seedlings planted 51 days after plots were sprayed with soil-active herbicides (experiment 1)*

Chemical	Rate (lb/acre)	Survival (%)	Total height (ft)
Control	—	79	1.0
Dicamba (Banvel)	4	92	1.0
Dicamba	8	72	1.0
Fosamine (Krenite)	12	75	1.0
Hexazinone (Velpar)	4	85	1.0
Picloram + 2,4,-D amine (Tordon 101)	1 + 4	91	1.1
Triclopyr (Garlon)	4	77	1.0
Average		82	1.0

Table 2—*Survival and first-year height growth of loblolly pine seedlings planted 72 days after plots were sprayed with soil-active herbicides (experiment 2)*

Chemical	Rate (lb/acre)	Survival (%)	Height growth (ft)
Control	—	93	1.1
Dicamba (Banvel)	4	96	1.2
Dicamba	8	88	1.1
Dicamba + 2,4-D amine	3 + 5.7	96	1.2
Dicamba + triclopyr	4 + 2	95	1.3
Fosamine (Krenite)	12	89	1.1
Hexazinone (Velpar)	4	90	1.1
Picloram + 2,4-D amine (Tordon 101)	1 + 4	97	1.1
Triclopyr (Garlon)	4	88	1.2
Average		92	1.2

Conclusions

The results of these two experiments demonstrate that seedlings can be safely planted in areas sprayed with these tested soil-active herbicides within 2 months after treatment. This should allow ample time for herbicide degradation, because most fall applications of herbicides for site preparation in the South are made before October 15 and pine seedlings are usually not planted before mid-December.

Literature Cited

1. Kidd, F.A.; Cline, W.N. III; Hern, L.K. Fall site prep with Tordon and Garlon herbicides. Proceedings, Southern Weed Science Society 38:206-212; 1985.
2. Kidd, F.A.; Cline; W.N., III; Hern, L.K. Third-season hardwood control with fall-applied Tordon/Garlon herbicides. Proceedings, Southern Weed Science Society 39:260; 1986.