PINE RESPONSE AND HARDWOOD DEVELOPMENT AFTER BRUSHSAWING AND MANUAL HERBICIDE RELEASE OF LOBLOLLY PINE

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Introduction

Manually applied release treatments with herbicides have been increasing in use over the past decade in forests of the southeastern U.S.. Both industrial and non-industrial forest land managers are employing directed foliar sprays and basal sprays of herbicides. Innovations of these standard application methods utilize lower volumes, better nozzles, and improved backpack sprayers that increase worker productivity. Currently registered herbicides have greater control over a wider range of species than those previously used and are effective over a wider application window (Miller 1990a; 1990b), and safer for the applicator and the environment (USDA Forest Service 1984).

Treatments tested in this study are selective treatments that can be applied to single plants. Two broad-spectrum herbicides, imazapyr and triclopyr, were tested as both low-volume directed sprays and low-volume basal sprays using rates of equal cost. The brushsaw testing was included as an experimental treatment for the region. While commonly utilized in the Northeastern U.S.A. for hardwood release, brushsaws are still relatively uncommon in the Southeastern Region- The inclusion of brushsawing in this comparative research is warranted because there is a growing public perception that manual clearing is environmentally safer than herbicide treatments. Brushsawing alone, however results in prolific resprouting of most woody plants and a quick resurgence of woody competition. Thus, brushsawing was also tested with a herbicide application to the cut stem to deter resprouting.

Materials

Treatments were installed in a completely randomized block design with four replications in May 1987. Treatment plots were 0.08 ha in size and included two 2.4 m x 21 m competition measurement plots (CMP) and a 0.04 ha pine measurement plot (PMP). Pines, which were 3 years old when the study was installed, were measured on PMP's initially and 1, 2, 3, 5 and 9 growing seasons after treatment (GSAT). Woody competition above 0.6 m tall was measured on CMP's initially and 2 GSA?'. Additionally, a 100 percent hardwood tally was done on the PMP's for rootstocks taller than 1.4 m at 2, 5, and 9 GSAT.

Treatments consisted of herbicide applications, the use of a brushcutter to cut down hardwoods, and an untreated check. The herbicide treatments compared two backpack application methods (directed foliar vs. streamline basal) and two herbicides (imazapyr vs. triclopyr) for a total of four different herbicide treatments. The two brushcutter treatments compared cutting the hardwoods with or without a wick application of herbicide (2, 4-D + picloram) to the cut surface. Only woody competition greater than 0.6 m in height was treated or cut. The brushcutter

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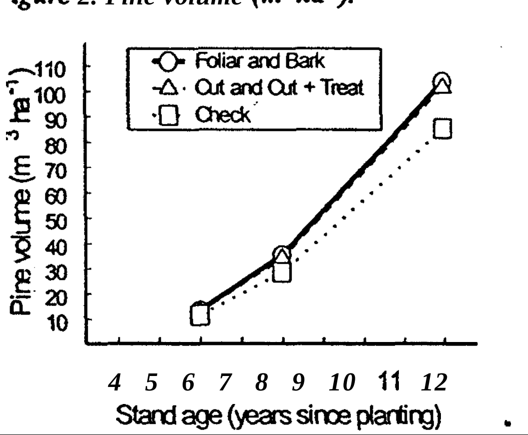
smaller increases in rootstocks and the treatments with the best efficacy (imazapyr foliar and triclopyr basal) had the fewest rootstocks. The increase in rootstocks between 5 and 9 GSAT on the herbicide treatments may be due to root sprout growth. The decline of rootstocks on the check and brushcut treatments suggests that some self-thinning may be occurring at these higher hardwood densities.

Hardwood basal area differed from the check but was similar among all treatments 2 and 5 GSAT. Although rootstock numbers were high following brushcutting, hardwood sprouts were short and accounted for little basal area (Figure 1). Hardwood basal area continued to increase with age for all treatments and only the herbicide treatments reduced hardwood basal area 9 GSAT.

Plots within a block were not matched in terms of pine density and height at the initiation of the study. Therefore, analysis of covariance was used to reduce variation due to differences in initial number and height of pines. Pine dbh, stand basal area, and stand volume were increased by all hardwood control treatments. Response through age 12 (9 GSAT) was of similar magnitude for the two brushcutter treatments and the 4 herbicide treatments. Increases in age 12 pine basal area were 3.2 and 2.5 m^2 ha^{-1} greater than the check (check=16.2 m^2 ha-‘) for the average of the 4 herbicide and 2 brushcut treatments, respectively. There were no significant differences in response between application method (fohar vs. bark) or herbicide used (imazapyr vs. triclopyr). Use of a herbicide stump treatment following brushcutting did not improve response over brushcutting alone. There was no response in average height of dominant and co-dominant pine trees from any treatment.

Pine volume did not differ among the treated plots at age 12. Age 12 pine volume increases were 18.4 and 16.3 m^3 ha^{-1} greater than the check (check=85.4 m^3 ha-‘) for the average of the 4 herbicide and 2 brushcut treatments, respectively. Pine response, which was comparable among all treatments, was better correlated with hardwood basal area (size) than with number of rootstocks. However, hardwood basal area began to diverge among treatments between age 9 and 12, and this may impact pine volume at future ages.

Figure 2. Pine volume (m^3 ha^{-1}).



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