

STRATEGIES TO ACHIEVE LONG-TERM BENEFITS FROM MULTIPLE OPERATIONAL HERBICIDE APPLICATIONS IN LOWER COASTAL PLAIN PINE STANDS

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Abstract—Studies were installed on a range of soils to examine different post-plant herbaceous weed control timings following different site preparation timings with Chopper® herbicide. Chopper site preparation treatments were applied after bedding and included two application dates (August versus November). Pines were planted in winter following site preparation. Site prep was followed with four different post-plant herbaceous weed control timings. This report examines pine growth after five years and relates optimal herbaceous weed control strategies to vegetation cover levels in the absence of weed control. Contrary to expectation, the November Chopper application did not increase residual weed control over the August application. The earlier Chopper application date resulted in better growth than the later date on four of five sites. Optimal strategies for post-plant herbaceous weed control were highly dependent on site, ranging from two consecutive years of weed control on a silt-loam soil to no benefit from any additional weed control on spodosols.

INTRODUCTION

Conventional wisdom indicates that site preparation with Chopper herbicide should occur late in the year for best control of woody vegetation and best residual weed control into the first pine growing season; that post-plant herbaceous weed control treatments should occur early in the first pine year; and that there is little benefit from a second year of herbaceous weed control. These ideas are derived mainly from studies that looked at site preparation or herbaceous weed control as independent treatments and where the quality of modern operational herbicide prescriptions was not considered. Questions which have been poorly addressed include: (1) Does late season site preparation with Chopper result in better residual control in the year following treatment than earlier season treatment? (2) Does late-season site prep result in the best pine growth? (3) Is herbaceous weed control early in the first year always best? (4) Are there any situations where two consecutive years of herbaceous weed control are desirable? To answer these questions a series of studies were installed on Lower Coastal Plain, Upper Coastal Plain and Piedmont sites. These studies used modern operational prescriptions to look at integrated systems of site prep and herbaceous weed control. This paper describes fifth-year results for five Lower Coastal Plain installations.

METHODS

Treatments included 48 ounces Chopper herbicide applied after bedding at two different timings (August versus November). Pines were planted in winter following site preparation. Post-plant treatments were herbaceous weed control (HWC) applied at different times as follows: (1) never, (2) March of the first pine year, (3) June of the first pine year, (4) March of the second pine year, (5) June of the first pine year followed by March of the second pine year. Treatments were arranged in a split-plot design with site prep timing as the main-plot factor and HWC timing as the subplot factor. Each installation included three replications. Recolonization of vegetation was evaluated in June, August, and October of the first pine growing season and June and October of the second pine growing season. Pines were measured at the end of the first three growing seasons and at the end of the fifth growing season. Chopper site prep treatments included

Garlon™ 4 at either 1 or 2 pints for control of blackberry. Herbaceous weed control treatments were 4 ounces Arsenal® Applicators Concentrate plus 2 ounces Oust®.

RESULTS AND DISCUSSION

Analysis of variance indicated no interaction between site prep timing and HWC timing. Consequently, the discussion focuses on main effects.

Residual Control

Contrary to expectation, the November Chopper site prep timing did not improve residual control in the year following treatment over the August timing. Possible reasons are: (1) direct control of some perennial herbaceous species is improved when applications are made at a time when they are actively growing instead of later in the year when they have senesced, and (2) earlier season treatment may reduce the seed source for some species. In this study, species that were controlled better with earlier season site prep included bluestem grasses, swamp sunflower, pokeweed and sumac.

Site Prep Timing Effect on Pine Growth

August Chopper site prep treatment resulted in better growth than November treatment on four of the five sites. The earlier site prep date resulted in a 2 to 15 percent increase in mean pine stem volume over the later timing. This confirms results from a previous study installed on four Lower Coastal Plain sites that examined a larger range of site prep timings and documented larger growth gains from earlier season Chopper site prep treatments (Lauer and Quicke 2006).

Herbaceous Weed Control Timing Effect on Pine Growth

Optimal timing for herbaceous weed control was highly dependent on site. Sites are described below in terms of soil types. The CRIFF soil types are from Jokela and Long (2000).

1. The Oakdale, LA site had a medium-well to poorly-drained silt-loam soil (Glenmora/Caddo-Messer series). On this site herbaceous weed colonization was prolific

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in the absence of post-plant HWC. Herbaceous cover in the first pine year increased from 27 in June to 93 percent by October. Under these conditions (high herbaceous colonization) the best timing for a single HWC treatment was March of the first year. This timing increased pine growth by 29 percent compared to no HWC. The best response was from two consecutive years of HWC which resulted in a pine growth response of 44 percent compared to no HWC.

2. The Kings Ferry, FL site had a CRIFF A group soil (poorly drained clay) and the Green Swamp, NC site had a very-poorly to poorly-drained sandy-loam soil (Nakina/Grifton series). On these sites, herbaceous cover in the absence of post-plant HWC increased to 46 and 36 percent, respectively, by October of the first pine year. Under these conditions (moderate herbaceous colonization) the best HWC timing was March of the second pine growing season. This timing increased pine growth by 25 and 12 percent, respectively, compared to no HWC.
3. The Mount Pleasant, GA site had a CRIFF C group soil with a sandy surface, a spodic layer at 12 to 36 inches and argillic layer at 30 to 48 inches. The Tennille, FL site had a CRIFF D group soil (spodic layer with no argillic layer). On these two sites herbaceous cover in the absence of post-plant HWC never exceeded 20 percent in the first pine year. Under these conditions (low herbaceous colonization) there was no benefit from any of the HWC timings.

CONCLUSION

While more studies installed over multiple years would provide a better inference base, results from this study indicate that immediate productivity benefits are possible with site-specific timing of Chopper site preparation and Arsenal + Oust herbaceous weed control. This study demonstrates that optimal HWC timings are dependent on expected first year weed cover in the absence of HWC:

1. If expected maximum first year weed cover is 90 percent, the optimal strategy is two consecutive years of HWC or, if only one HWC treatment is to be used, the optimal timing is early in the first pine growing season.
2. If expected maximum first year weed cover is 30-50 percent, the optimal HWC timing is early in the second pine growing season.
3. If maximum first year cover never exceeds 20 percent, there is no need for HWC.

To apply these optimal timings in an operational setting, it is necessary to predict weed development in advance. Substituting soil type for expected weed development, these studies suggest the following optimal post-plant HWC timings for Lower Coastal Plain sites where site preparation consists of bedding followed by a Chopper herbicide treatment:

1. On medium-well to poorly-drained silt-loam soils use two consecutive years of HWC.
2. On CRIFF A group soils and very-poorly to poorly-drained silt-loam soils apply HWC early in the second year.
3. On CRIFF C and D group soils (Spodosols) no HWC is required.

Rainfall patterns and the presence of specific weed species may change outcomes. These guidelines provide a framework which can be built upon using operational experience.

LITERATURE CITED

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