PINE GROWTH FOLLOWING CHEMICAL SITE PREP AND POSTPLANT HERBACEOUS WEED CONTROL COMPARED TO CHEMICAL SITE PREP ONLY

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Abstract—Three site prep vegetation control systems were compared on two Piedmont and two Upper Coastal Plain sites. Systems were (1) a one-time site prep application of Chopper® GEN2™ [2], (2) a one-time application of Chopper® GEN2™ tank mixed with sulfometuron, and (3) two applications consisting of site prep with Chopper® GEN2™ followed by herbaceous weed control with Arsenal AC plus sulfometuron in March/April following planting. Each of these systems was repeated with a July/August, September, and October site prep timing. The third system, consisting of two applications, resulted in better pine response and vegetation control for site prep in July through September on Upper Coastal Plain sites. The first system, a one-time application of Chopper® GEN2™ , provided good weed control and pine growth on Piedmont sites. The sulfometuron tank mix did not improve vegetation control and had negative effects on pine growth on Piedmont sites.

INTRODUCTION

In recent years, herbicide site prep tank mixes have been used to provide both long-term control of woody vegetation and residual control of herbaceous weeds in the first pine year. While this option eliminates the cost of a second herbicide application, there is no published information on the effects of these different vegetation control systems on the growth of planted pine.

This research project examines vegetation control and loblolly pine (*Pinus taeda*) response to different vegetation management systems on Upper Coastal Plain and Piedmont sites. Chopper® GEN2™ herbicide and the herbicide sulfometuron were used in site prep treatments. Chopper® GEN2™ herbicide is both foliar and soil active. With foliar broadcast applications, Chopper® GEN2™ controls a broad spectrum of woody and herbaceous vegetation and provides some residual control of herbaceous weeds into the year following treatment. However, Chopper® GEN2™ alone often does not provide adequate residual weed control. The herbicide sulfometuron can be tank mixed with Chopper® GEN2™ to enhance residual herbaceous weed control, thereby potentially eliminating the need for an additional postplant herbaceous weed control application. Residual control of weeds into the first growing season may be dependent on site prep timing since residual herbicide in the soil is expected to decrease as time on the ground increases.

METHODS

Three vegetation management systems were compared—(1) a one-time site prep application of Chopper® GEN2™, (2) a one-time application of Chopper® GEN2™ tank mixed with sulfometuron, and (3) two applications consisting of site prep with Chopper® GEN2™ followed by herbaceous weed control with Arsenal AC plus sulfometuron in March/April following planting. Chopper® GEN2™ was used at 40 ounces per acre. The sulfometuron site prep rate was 3 ounces product per acre using a 75-percent active ingredient formulation. Postplant herbaceous weed control was 4 ounces per acre Arsenal AC tank mixed with 2 ounces product per acre sulfometuron. Site prep applications included 1 percent methylated seed oil (MSO) except for Carson, MS, where 12.5 percent MSO was used to improve control of yaupon (*Ilex vomitoria*). Burning was combined with site prep only at Appomattox, VA, where the site was burned in June 2005 about a month before the first site prep application.

Studies were installed at four locations, two on Upper Coastal Plain sites and two on Piedmont sites. Locations are characterized in terms of geographic location, soils, and planting in table 1. To quantify the effects of site prep timing, each vegetation management regime was repeated using site prep applications in July/August, September, and October (table 2). The September application in Mississippi was missed due to Hurricane Katrina.

At each location, a randomized complete block design experiment was installed with three replications. Treatment plots were 60 feet in length and seven tree rows in width. Measurement plots were three rows in width and 30 feet in length centered within each treatment plot. This resulted in approximately 15 measurement trees for each plot. Pine groundline diameter and total height were measured at the end of the first, second, and third years. Stem volume index was calculated as the volume of a cone using groundline diameter and total height. Vegetation cover was assessed in June of the first year using ocular estimates of percent cover.

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[2] Chopper® GEN2™ is a registered trademark of BASF Corporation.

Table 1—Study locations

Region	Location	Soils	Slope	Drainage	Planting
			percent		
Upper Coastal Plain	Greenville, AL	Orangeburg sandy loam	1 to 5	Well drained	Machine
Upper Coastal Plain	Carson, MS	Ora sandy loam (two reps) Smithdale sandy loam (one rep)	2 to 5 12 to 17	Moderate well to well drained	Machine
Piedmont	Appomattox, VA	Tatum silt loam	2 to 7	Well drained	Hand
Piedmont	Saluda, SC	Georgeville silt loam (two reps) Herndon silt loam (one rep)	2 to 6	Well drained	Machine

Table 2—Herbicide application details

	Site prep dates			
Location	July/August	September	October	HWC date
Greenville, AL	7/31/2005	9/13/2005	10/16/2005	3/31/2006
Carson, MS	7/28/2005	—	10/18/2005	3/26/2006
Appomattox, VA[a]	7/23/2005	9/03/2005	10/01/2005	4/19/2006
Saluda, SC	8/03/2005	9/09/2005	10/23/2005	3/19/2006

HWC = selective postplant herbaceous weed control application; — = application not made due to Hurricane Katrina.

[a] Appomattox was the only location that included burning with site prep (June 2005 prior to herbicide application).

RESULTS AND DISCUSSION

Vegetation Control

Chopper® GEN2™ site prep provided good control of hardwood species on all sites. However, control of herbaceous vegetation differed greatly between Upper Coastal Plain and Piedmont sites.

Upper Coastal Plain Sites—Single vegetation control treatments of Chopper® GEN2™ herbicide resulted in heavy herbaceous weed competition the year following treatment. Applying this treatment late in the year did not help to reduce the level of herbaceous competition in the year following treatment. The tank mix of Chopper® GEN2™ with sulfometuron applied in September and October greatly reduced vegetation cover with cover never exceeding 28 percent compared to Chopper® GEN2™ alone that was never <48 percent. However, the late July application of the tank mix was too early for good herbaceous weed control and resulted in >40 percent cover. The two applications management system of Chopper® GEN2™ followed with postplant herbaceous weed control provided robust weed control no matter when the site prep treatment was applied. Total cover was <28 percent for all site prep timings. For October site prep applications, one application of Chopper® GEN2™ plus sulfometuron provided better or equivalent vegetation control to the two-application system. For site prep in July through September, two applications resulted in substantially better weed control than one application of Chopper® GEN2™ plus sulfometuron.

Piedmont Sites—The single vegetation control treatment of site prep with Chopper® GEN2™ herbicide resulted in good herbaceous weed control the year following treatment with vegetation cover never exceeding 25 percent and cover decreased with later season site prep. The addition of sulfometuron to Chopper® GEN2™ site prep had little impact on weed cover since cover was already low for Chopper® GEN2™ without sulfometuron. Similarly, adding postplant herbaceous weed control had little impact on weed cover.

Pine Response

Upper Coastal Plain Sites—Vegetation control and pine response generally increased with treatment intensity. Chopper® GEN2™ alone was not adequate on these sites with aggressive vegetation. Chopper® GEN2™ combined with postplant herbaceous weed control provided better response than the single application of the Chopper® GEN2™ with sulfometuron tank mix but timing was also important.

Chopper® GEN2™ applications made in September or earlier followed with postplant herbaceous weed control resulted in substantially better pine growth than one application of Chopper® GEN2™ tank mixed with sulfometuron. Growth increases in year 3 pine volume index were over 50 percent for July site prep and 14 percent for September site prep. For October site prep, results were variable with two applications resulting in similar pine growth at Carson, but less pine growth at Greenville compared to one application of Chopper® GEN2™ tank mixed with sulfometuron.

Piedmont Sites—The most consistent treatment was one application of Chopper® GEN2™ alone. This treatment resulted in very good weed control in the year following treatment with little room for improvement from more intensive treatments. Adding sulfometuron to Chopper®GEN2™ often had a negative effect on pine growth.

Site prep timing was a factor at Saluda. Pine response was better for the earlier applications of Chopper® GEN2™ alone even though vegetation cover decreased from 25 to 8 percent as site prep was delayed from August to October. This trend was not evident at Appomattox where there was little difference in pine growth among site prep dates. The hot burn at Appomattox prior to the first site prep treatment may have negated some of the benefits of early season site prep.

OPERATIONAL RECOMMENDATIONS

While single application vegetation control consisting of site prep with Chopper® GEN2™ tank mixed with sulfometuron has been widely adopted, there is no published information on pine growth responses compared to other treatments. Results may vary by year because of changing environmental conditions and will depend on site-specific weed species. However, these studies provide a framework for planning and evaluation of operational treatments for pine response.

Upper Coastal Plain Recommendations

Use two applications on sites with sandy-loam soils consisting of Chopper® GEN2™ site prep applied early (July through September) followed by postplant herbaceous weed control in the spring. In the event that site prep must be delayed until October, use a single application of Chopper® GEN2™ tank mixed with sulfometuron with the understanding that this timing does not result in the best pine growth.

Piedmont Recommendations

Use one application consisting of Chopper® GEN2™ site prep on sites with silt-loam or finer textured soils. Do not add sulfometuron and do not follow with postplant herbaceous weed control. Apply the site prep treatment early in the growing season for best pine response.

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