FIRST- AND FIFTH-YEAR RESULTS OF A CHOPPER GEN2 SITE PREPARATION TIMING TRIAL

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Forest site preparation using imazapyr products such as Arsenal AC® and Chopper® are common in the southern United States. In 2006, Chopper Gen2® was a new formulation of imazapyr that differed from previous Chopper EC® or Arsenal AC®. Short-term site preparation tests showed positive results. Long-term effects of site preparation, as well as effects of application timing with the new formulation, were unknown, and the information was needed for operational decisions.

The objectives of this study were to: (1) evaluate the effect of application timing on efficacy of Chopper Gen2 for competition control; (2) evaluate loblolly pine (*Pinus taeda* L.) seedling survival and first-year growth response to different application timings; and (3) evaluate long-term growth and survival response of loblolly pine to different application timings. A randomized complete block design with four blocks was implemented on three sites, one each at Allen, LA; Starkville, MS; and Appomattox, VA. Plots were each approximately 0.19 acre in size. Each site had varied amounts of tree, shrub and other vegetative competition and received various levels of pre-application mechanical site preparation. The Louisiana site was bedded prior to application and had light hardwood competition with American beautyberry (*Calicarpa americana* L.), sumac (*Rhus* spp.), and blackberry (*Rubus* spp.) as the major competitors. The Mississippi site was harvested over 1 year prior to herbicide application, received no mechanical site preparation, and had heavy hardwood competition consisting of red oaks (*Quercus* spp.), post oak (*Q. stellata* Wangenh.), sweetgum (*Liquidambar styraciflua* L.), black tupelo (*Nyssa sylvatica* Marsh.), red maple (*Acer rubrum* L.), shagbark hickory [*Carya ovata* (Mill.) K. Koch], and blackberry. The Virginia site received no mechanical site preparation, and herbicide was applied soon after harvest.

Competing vegetation was moderate with dominate competitors consisting of white oak (*Q. alba* L.), scarlet oak (*Q. coccinea* Münchh.), red maple, yellow poplar (*Liriodendron tulipifera* L.), black tupelo, black cherry (*Prunus serotina* Ehrh.), hickory (*Carya* spp.), and blueberry (*Vaccinium* spp.).

The herbicide treatments were applied at three different timings; July 1, August 15, and September 30, 2006. All treatments, except for the control, received Chopper Gen2® at a rate of 32 ounces per acre plus 1.0 percent v/v methylated seed oil. Site preparation was followed by hand planting with 1-0 bareroot loblolly pine seedlings in December 2006 and an herbaceous weed control treatment of 4 ounces Arsenal AC® plus 2 ounces Oust® per acre in March 2007 in all treated plots. Control plots did not receive herbaceous weed control treatment.

Control of competing vegetation was assessed in June and August 2007. Year 1 results indicate statistically less competing vegetation in herbicide-treated plots, for all timings, than in the control. Significant reduction in competition between timings only occurred for the late timing (September 30) in Mississippi (table 1). Year 1 pine survival was not different from the control for any timing. The only differences in survival among timings occurred for the August 15 timing in Mississippi, which was significantly lower than the other timings. Height and diameter growth in Louisiana were significantly greater than the control in all treatments, with no differences among timings. In Mississippi, height growth was greater than the control only in the September timing, which also showed significantly greater diameter growth than the control and other timings. Both other timings also exhibited greater diameter growth than the control; however, they were less than the September 30 timing. In Virginia, no differences were detected in height growth, and diameters

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Table 1--Year 1 and year 5 results for loblolly pine seedling survival, groundline diameter, height, and volume index for three Chopper Gen2 herbicide application timings on three sites in Louisiana, Mississippi, and Virginia

	Louisiana				Mississippi				Virginia			
Year/ timing	Survival	Diam.[a]	Height	Volume index	Survival	Diam.	Height	Volume index	Survival	Diam.	Height	Volume index
	%	*inches*	*feet*	*feet*^{3}	*%*	*inches*	*feet*	*feet*^{3}	*%*	*Inches*	*feet*	*feet*^{3}
Year 1												
July 1	86a[a]	0.77a	2.8a	n/a	86a	0.28b	1.6ab	n/a	89a	0.42a	1.3a	n/a
Aug. 15	86a	0.67a	2.6a		63b	0.28b	1.5b		85a	0.37a	1.2a	
Sept. 30	90a	0.68a	2.5a		89a	0.36a	1.9a		86a	0.40a	1.3a	
Control	77a	0.29b	1.7b		76ab	0.17c	1.3b		82a	0.21b	1.1a	
Year 5												
July 1	77a	4.2a	15.6a	58.3a	83a	3.9a	17.4a	54.4a	n/a	n/a	n/a	n/a
Aug. 15	84a	4.7a	16.2a	63.3a	58b	4.0a	17.0a	34.1ab				
Sept. 30	83a	4.6a	15.3a	59.3a	84a	4.1a	17.6a	56.0a				
Control	65a	2.6b	10.3b	20.3b	69ab	1.9b	10.8b	8.0b				

[a]Values within a column and year, sharing the same letter, are not significantly different at α = 0.05, as determined by Duncan's New Multiple Range Test. Diam. is diameter.

were significantly greater than the control for all timings. Year 1 differences between timings were only evident in Mississippi which exhibited greater pine height, diameter, and volume index growth for the September 30 timing. The Mississippi site had the most advanced competing vegetation of the three sites; improved performance from the late timing is likely a result of improved competition control.

Year 5 data were only collected for the Mississippi and Louisiana sites. Year 5 results indicated significantly greater height and diameter growth for all herbicide treatments than the untreated control. However there were no statistical differences among herbicide timings (table 1). The same results were found for volume index with the exception of the August 15 timing in Mississippi, which was not statistically greater than the control nor statistically less than the other timings. Differences in volume index growth for the Mississippi-August 15 timing resulted from year-1 survival rather than differences in growth parameters.

Results indicate Chopper Gen2® herbicide site preparation application, followed by herbaceous weed control, significantly increased long-term loblolly pine height, diameter, and volume index growth over untreated plantations. Timing of herbicide application had little long-term impact on loblolly pine growth or volume index.