

# CONTROL OF UNWANTED HARDWOODS WITH JUNE-APPLIED CHOPPER® GEN2™ AND CHOPPER® ON FIVE SITES

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**Abstract**—Chopper® GEN2™ is an improved formulation of Chopper®, offering enhanced early product performance. Managers of southern timberlands routinely apply Chopper® from July through October. A wider application window allows managers more time to complete the applications needed for effective weed control. GEN2™ offers to expand the application window into June. One site each in Louisiana, Mississippi, Oklahoma, South Carolina, and Virginia were selected for testing. The objective was to compare the control of unwanted hardwoods with Chopper (32 ounces product per acre) and Chopper® GEN2™ (32 ounces product per acre) mixed with zero, 2.5 percent, 7.5 percent, and 12.5 percent methylated seed oil (MSO). All sites were treated between June 2–14, 2005. Red maple (*Acer rubrum* L.), blackgum (*Nyssa sylvatica* Marsh.), sweetgum (*Liquidambar styraciflua* L.), red oak (*Quercus falcata* Michx.), white oak (*Q. alba* L.), and yellow-poplar (*Liriodendron tulipifera* L.) were the major hardwoods tested. Two growing seasons after treatment, there were two findings of operational significance. First, percent control of Chopper® GEN2™+2.5 percent MSO was better than Chopper®+2.5 percent MSO and equivalent to Chopper®+12.5 percent MSO. This finding allows early (pre-June 15) application at reduced MSO volumes and cost without reduced control. Second, the overall control for the best treatment in this study was 87 percent, indicating higher rates could provide even higher control.

## INTRODUCTION

Chopper® is commonly used for herbicidal preparation of pine sites for planting. Chopper® GEN2™ is an improved formulation of Chopper®, offering enhanced early product performance. Both products contain the active ingredient, imazapyr.

Managers of southern timberlands routinely apply Chopper® from July through October. Unfavorable weather between July and October increases the difficulty in completing timely applications. A wider application window allows managers more time to complete the applications needed for effective weed control. Opportunity exists to expand the application window into June.

## METHODS

The objective of this study was to compare the control of unwanted hardwoods with a single foliar application of Chopper® (32 ounces product per acre) or Chopper® GEN2™ (32 ounces product per acre) mixed with zero, 2.5 percent, 7.5 percent, and 12.5 percent Conquer MSO when preparing pine sites for planting.

Five sites, one each in Louisiana, Mississippi, Oklahoma, South Carolina, and Virginia were selected for testing. Site physiography and major hardwood species groups are summarized in table 1.

Trees were visually evaluated at 2, 4, and 8 weeks after treatment (WAT) for brownout in 10 percent intervals with zero = no browned foliage and 100 = total browned foliage. Percent control was computed after one, two, and three growing seasons after treatment (GSAT). Percent control was defined

as (sum of initial height-sum of height on evaluation day) per sum of initial height. Initial height was recorded pretreatment and evaluation height in September 2006 and 2007 and in Virginia only again in 2008. In Oklahoma, both timings were oversprayed with an operational treatment prior to the fall 2006 assessment.

## RESULTS AND DISCUSSION

### Brownout

Numerical patterns in brownout were detected (table 2). The numerical data pattern is very consistent. Commonly, brownout was greater for GEN2™+2.5 percent MSO than Chopper®+2.5 percent MSO for 9 of 12 State-species combinations at 2 and 4 WAT and 10 of 12 State-species combinations at 8 WAT (table 2). At 2, 4, and 8 WAT, sweetgum in South Carolina and red maple in Virginia browned more from 2.5 percent MSO with Chopper® than GEN2™ (table 2).

### Control

Numerical patterns for percent control for major species groups at each location were observed and are presented in table 3. The industry standard Chopper®, mixed with 2.5 percent MSO, seldom exceeded GEN2™+2.5 percent MSO control. For example, Chopper®+2.5 percent MSO control exceeded GEN2™+2.5 percent MSO by 10 percent or more only 3 of 15 or 2 of 12 site-species combinations 1 or 2 GSAT, respectively. This speaks to the high consistency with which June-applied GEN2™ controlled woody weeds on test sites. GEN2™+2.5 percent MSO control remained the same (100 percent) or increased from one to two GSAT for all site-species combinations (table 3). This was only slightly better than Chopper®+2.5 percent MSO that decreased in control

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**Table 1—Physiography, major species groups, and herbicide application date for each site**

Site	Appomattox, VA	Homer, LA	Mathiston, MS	Broken Bow, OK	Pendleton, SC
Physiography	Piedmont	Hilly Coastal plain	Hilly Coastal plain	Hilly Coastal plain	Piedmont
Species groups	Blackgum		Blackgum	Elm	
	Red maple	Red maple	Red maple	Red maple	
	White oak		Red oak		
		Sweetgum	Sweetgum		Sweetgum
					Yellow-poplar
	All	All	All	All	Average
Sprayed	June 11, 2005	June 14, 2005	June 3, 2005	June 2, 2005	June 7, 2005

from one to two GSAT only once (all species in Louisiana). This consistent performance suggests GEN2™ may provide the same reliable control managers have long observed with Chopper®.

Control by GEN2™+2.5 percent MSO was similar to the operational standard, Chopper®+12.5 percent MSO, for most species and sites (table 4). This was not always true. One GSAT, Chopper® out performed GEN2™ at controlling all species in Louisiana, sweetgum in South Carolina and red maple in Virginia. But, for all three examples control two GSAT was similar or better for GEN2™+2.5 percent MSO than Chopper®+12.5 percent MSO.

Control three GSAT is not presented. Limited data exists. From this data, white oak in Virginia was the only example where Chopper®+12.5 percent MSO (100 percent) provided more long-term control than GEN2™+2.5 percent MSO (89 percent). Rather, GEN2™+2.5 percent MSO provided more control three GSAT than Chopper®+12.5 percent MSO for red maple, blackgum, and all species.

When averaged for common species, table 4 illustrates the strong data patterns favoring June-applied GEN2™+2.5 percent MSO rather than Chopper®+12.5 percent MSO for control of several species commonly occupying pine sites. This pattern is significant because this shows managers can reduce the MSO cost without decreasing control. Furthermore, GEN2™+2.5 percent MSO provided 87 percent mean control across sites and species leaving managers the opportunity to use higher rates for more control if desired.

### SUMMARY

After two growing seasons, there were two findings of operational significance. First, percent control of unwanted hardwoods with Chopper® GEN2™+2.5 percent MSO was better than Chopper®+2.5 percent MSO and equivalent to Chopper®+12.5 percent MSO, the industry standard. When compared with the industry standard, this finding supports early (June 2–14) application of GEN2™+2.5 percent MSO for reduced cost without reduced control. Second, the overall control for the best treatment in this study was 87 percent, indicating higher rates could provide even higher control.

**Table 2—Brownout (percent) at 2, 4, and 8 weeks after treatment from 32 ounces of Chopper® or Chopper® GEN2™ with different amounts (percent) of methylated seed oil**

State, Species, and treatment	Weeks after treatment <sup>a</sup> and methylated seed oil (percent)											
	2				4				8			
	0	2.5	7.5	12.5	0	2.5	7.5	12.5	0	2.5	7.5	12.5
Louisiana												
Red maple												
GEN2™	4	3	29	1	5	4	38	3	57	37	70	84
Chopper®	17	3	6	25	18	5	7	48	19	7	20	60
Sweetgum												
GEN2™	23	28	24	22	30	52	37	33	38	70	63	50
Chopper®	17	27	18	20	37	28	30	22	44	28	38	27
Mississippi												
Blackgum												
GEN2™	82	91	6	82	97	97	54	93	100	100	86	100
Chopper®	5	64	85	92	17	96	97	99	26	100	99	100
Red maple												
GEN2™	10	17	6	20	34	84	35	73	93	100	85	100
Chopper®	8	17	18	11	32	68	86	48	59	97	100	100
Red oak												
GEN2™	3	5	3	4	5	7	5	6	24	76	49	51
Chopper®	1	1	3	3	3	3	8	6	22	43	59	79
Sweetgum												
GEN2™	22	—	14	30	72	—	86	97	99	—	99	100
Chopper®	5	27	54	27	14	22	88	89	23	40	100	99
Oklahoma												
Elm												
GEN2™	1	16	3	7	2	20	12	22	2	36	15	25
Chopper®	1	6	2	11	2	9	9	15	2	13	16	22
Red maple												
GEN2™	1	20	2	5	10	27	10	15	12	59	36	63
Chopper®	1	2	5	8	5	16	17	17	6	28	37	29
South Carolina												
Sweetgum												
GEN2™	40	37	34	21	40	37	34	21	39	49	49	56
Chopper®	28	55	34	38	28	55	34	38	44	54	51	67
Yellow-poplar												
GEN2™	8	7	10	9	11	12	11	12	13	38	32	24
Chopper®	8	10	11	11	11	11	19	13	43	22	32	30
Virginia												
Blackgum												
GEN2™	53	78	78	62	64	85	90	72	69	90	96	84
Chopper®	16	57	81	82	20	68	88	86	24	73	97	89
Red maple												
GEN2™	30	40	33	29	47	58	50	54	62	76	76	84
Chopper®	11	55	27	42	23	72	51	60	33	90	68	83
White oak												
GEN2™	4	10	8	11	10	18	15	17	18	56	55	51
Chopper®	4	6	10	10	5	12	24	17	8	42	57	42

<sup>a</sup> For all evaluations: Louisiana and South Carolina check brownout = zero, Mississippi check brownout was ≤1 percent, Oklahoma check brownout was <14 percent for elm (*Ulmus* spp.) and <4 percent for red maple, and Virginia check brownout was <7 percent.

**Table 3—Control (percent) one or two growing seasons after treatment from a foliar application of Chopper® or Chopper® GEN2™ (32 ounces) with different amounts (percent) of methylated seed oil**

State and treatment	Growing seasons after treatment and methylated seed oil (percent)															
	1				2				1				2			
	0	2.5	7.5	12.5	0	2.5	7.5	12.5	0	2.5	7.5	12.5	0	2.5	7.5	12.5
Louisiana	Red maple								All							
GEN2™	24	66	40	32	79	98	85	72	27	51	42	27	65	77	74	65
Chopper®	12	24	42	31	45	54	95	93	65	77	74	65	25	55	73	78
Check	-14				-47				-10				-38			
	Sweetgum															
GEN2™	29	36	44	22	51	56	64	58								
Chopper®	6	26	38	37	5	55	51	63								
Check	-7				-30											
Mississippi	Blackgum								Sweetgum							
GEN2™	97	100	71	100	100	100	100	100	97	—	80	87	100	—	100	100
Chopper®	48	100	91	100	78	100	100	100	33	45	93	90	80	64	100	100
Check	-27				-49				-64				-182			
	Red maple								All							
GEN2™	100	100	93	100	100	100	93	100	86	94	75	92	90	100	98	100
Chopper®	54	100	100	100	92	100	100	100	49	74	90	92	80	84	99	100
Check	-36				-27				-35				-78			
	Red oak															
GEN2™	49	83	54	80	58	100	100	100								
Chopper®	61	50	75	79	70	73	96	100								
Check	-12				-53											
Oklahoma	Elm								All							
GEN2™	-9	34	21	38	—	—	—	—	6	59	47	49	—	—	—	—
Chopper®	4	37	56	15	—	—	—	—	22	58	46	36	—	—	—	—
Check	-17								-15							
	Red maple															
GEN2™	30	62	53	82	—	—	—	—								
Chopper®	24	58	59	68	—	—	—	—								
Check	-25				—	—	—	—								
South Carolina	Sweetgum								Yellow-poplar							
GEN2™	37	39	59	52	76	92	96	96	6	16	21	22	100	100	100	100
Chopper®	39	49	50	64	81	83	89	95	19	8	31	21	100	84	97	100
Check	0				-57				-8				-63			
Virginia	Blackgum								White oak							
GEN2™	-43	95	93	79	-66	96	100	62	19	59	56	47	35	71	93	81
Chopper®	33	59	87	86	-77	65	100	100	-5	42	45	32	-9	81	96	93
Check	-163				-421				-40				-134			
	Red maple															
GEN2™	34	59	54	56	72	86	65	43								
Chopper®	-12	84	50	78	-19	100	79	78								
Check	-101				-238											

**Table 4—A summary of control (percent) two growing seasons after a foliar treatment of Chopper® or Chopper® GEN2™ herbicide (32 ounces) was applied with different amounts of methylated seed oil**

Herbicide	MSO	Virginia			Louisiana		Mississippi			South Carolina		Mean
		BLG	REM	WHO	REM	SGM	BLG	REM	REO	YEP	SGM	
		<i>percent</i>										
GEN2™	0.0	-52	86	60	79	—	100	100	58	100	76	61
	2.5	100	86	89	98	—	100	100	100	100	92	87
	7.5	100	74	93	85	—	100	93	100	100	96	85
	12.5	60	41	97	72	—	100	100	100	100	96	78
Chopper®	0.0	-75	5	-5	45	—	78	92	70	100	81	39
	2.5	65	100	88	54	—	100	100	73	84	83	75
	7.5	100	81	100	95	—	100	100	96	97	89	87
	12.5	100	67	100	93	—	100	100	100	100	95	87

MSO = methylated seed oil; BLG = blackgum; REM = red maple; WHO = white oak; SGM = sweetgum; REO = red oak; YEP = yellow-poplar.