

of hardwoods and understory grasses and forbs. Foliar brownout of hardwoods was measured on a per species basis in SC.

Herbicide treatments resulted in low levels of brownout of understory grass species at both sites. In Mississippi dicamba + glyphosate + imazapyr and dicamba + primisulfuron-methyl + prosulfuron + triclopyr provided 60 and 50 % brownout respectively. In South Carolina dicamba + primisulfuron-methyl + prosulfuron + glyphosate and dicamba + glyphosate + imazapyr provided 60 and 57 % brownout of grasses, respectively. Brownout of grasses was significantly lower with all other tank mixtures.

All treatments resulted in greater than 75 % brownout of broadleaf forbs in MS and SC. These included dicamba + primisulfuron-methyl + prosulfuron + imazapyr, dicamba + primisulfuron-methyl + prosulfuron + glyphosate, dicamba + glyphosate + imazapyr, dicamba + primisulfuron-methyl + prosulfuron + triclopyr, dicamba + fosamine and dicamba + fosamine + imazapyr.

Three treatments resulted in effective hardwood control in MS. Dicamba + Fosamine + imazapyr, dicamba + primisulfuron-methyl + prosulfuron + triclopyr and dicamba + glyphosate + imazapyr provided 77, 85 and 88 % brownout, respectively. All other treatments provided less than 60 % brownout. None of the treatments provided effective (>75 %) hardwood brownout in South Carolina.

**TANK MIXTURES OF DICAMBA WITH IMAZAPYR, GLYPHOSATE, TRICLOPYR, AND FOSAMINE FOR WOODY STEM CONTROL.** A.W. Ezell and L.R. Nelson, Mississippi State University, Starkville, and Clemson University, Clemson, S.C.

#### ABSTRACT

A total of nine herbicide mixes were applied to evaluate the efficacy on brownout and woody stem control in site preparation situations. All treatments included dicamba and were replicated three times at two locations (Mississippi and South Carolina). Overall, brownout was acceptable, but many woody species were not controlled exceptionally well by these treatments. Time of application could be an important factor. In Mississippi, Vanquish + Arsenal, Vanquish + Accord, and Vanquish + Arsenal + Krenite mixes gave best results. In South Carolina, the Vanquish + Arsenal, Vanquish + Arsenal + Garlon, Vanquish + Arsenal + Accord, and Vanquish + Arsenal + Krenite mixes gave best results.

#### INTRODUCTION

In a continuing effort to evaluate the use of dicamba in forestry site prep work various tank mixtures of Vanquish and other forestry herbicide were applied to a recently harvested area. Both woody stem control and brownout response will be evaluated.

#### METHODS

All 10 treatments were applied as per Novartis protocol (Table 1). Plot installation was in RCB design. Plot layout was a 25 ft. x 100 ft. linear plot marked with metal rebar center posts. Nylon string was stretched between the rebar and the sample area of 10 ft. x 80 ft. was centered in the treatment. All treatments were replicated 3 times with application completed in mid-August for both sites.

All woody stems in the sample area were tallied by species and height class prior to spray application. Plots were evaluated for percent brownout by vegetation class at 6 WAT. Plots were evaluated in November 1999 to determine woody stem control.

The study was installed at locations in both Mississippi and South Carolina. The Mississippi site is representative of upper coastal plain and the previous stand had been mixed pine hardwoods. The South Carolina site is representative of Piedmont and previous use had also been mixed pine and hardwoods.

#### RESULTS

The results of brownout evaluation were presented earlier. Overall, only treatments No. 6 and 7 gave good brownout on the grasses. This is partially due to the species present and coverage afforded by taller vegetation (especially broadleaf herbaceous). All treatments worked very well on broadleaves but Treatment 6 was best. In woody stems, Treatment 6 was best and Trt. 3 (Vanquish & Garlon 4), Trt. 5 (Vanquish & Arsenal & Garlon), and Trt. 7 (Vanquish & Arsenal & Finale) gave good brownout.

Woody stem control—Evaluation of the species present in sufficient numbers for statistical comparison provided results found in Tables 2 and 3. Overall, these treatments did not provide the level of control that would be most desirable. Fore red maple (*Acer rubrum*), only Treatment No. 1 (Vanquish/16 oz Arsenal) have good control. Green ash (*Fraxinus pennsylvanica*) was not controlled well by any of the treatments, but Trt. 4 (Vanquish/Garlon) and Trt. 5

(Vanquish/accord) were the best in the study. Only the Vanquish/Arsenal/Finale mixture gave excellent control of persimmon (*Diospyros virginiana*). All except Trt. 7 gave excellent control of winged sumac.

For black cherry (*Prunus serotina*), only Trt. 6 (Vanquish/Arsenal/accord) and Trt. 9 (Vanquish/Arsenal/Krenite) gave good control. Plum (*Prunus* spp.) was adequately controlled by Trts. 4, 6, 9, and 2 (Vanquish/Arsenal). Sweetgum (*Liquidambar styraciflua*) was readily controlled by Trts. 1, 5, 6, 8, and 9.

#### SUMMARY

The treatments in the study gave acceptable brownout, but most of the woody species were not controlled exceptionally well. The results of the "1998 Vanquish Timing Study" provided results which help explain these results as successful control with dicamba mixes appears to be dependent on time of application.

Table 1. List of treatments in 1998 Novartis Forestry Site Prep Field Trials

Treatment No.	Herbicide Product and Rate/A
1	Vanquish (2qts.) + Arsenal (16 oz)
2	Vanquish (2qts.) + Arsenal (10 oz)
3	Vanquish (2qts.) + Garlon 4 (2qts.)
4	Vanquish (2qts.) + Accord (3qts.)
5	Vanquish (2qts.) + Arsenal (10 oz) + Garlon 4 (1 qt.)
6	Vanquish (2qts.) + Arsenal (10 oz) + Accord (2qts.)
7	Vanquish (2qts.) + Arsenal (10 oz) + Finale (1 qt.)
8	Vanquish (2qts.) + Krenite (3qts.)
9	Vanquish (2qts.) + Arsenal (10 oz) + Krenite (2qts.)
10	Untreated Check

Table 2. Woody stem control (percent change) in 1998 Novartis site preparation study – Mississippi

Treatment	Species				Total
	Red Maple	Green Ash	Persimmon	Winged Sumac	
	Percent <sup>1</sup>				
1	- 72.2 a <sup>2</sup>	+39.1 c	-50.0 bc	-100.0 a	-81 a
2	+118.8 e	- 28.8 ab	-50.0 bc	*	-26 bc
3	- 43.5 b	+168.0 e	-66.7 b	-100.0 a	-34 b
4	+ 10.7 d	-40.0 a	-75.0 b	-100.0 a	-73 a
5	+ 22.6 d	-45.4 a	-20.0 c	-100.0 a	-64 ab
6	- 30.6 b	+53.8 cd	-50.0 bc	-100.0 a	-68 ab
7	+ 70.0 e	+133.0 d	- 100.0 a	- 50.0 c	-43 b
8	- 2.1 cd	+100.0 d	+100.0 d	-100.0 a	-11 c
9	- 66.7 a	-22.2 ab	+200.0 e	-100.0 a	-76 a
10	+ 850.0 f	+350.0 f	400.0	-71.4 b	+475 d

<sup>1</sup> Positive values indicate an increase in stems/acre

<sup>2</sup> Values followed by the same letter in a column do not differ at p= 0.05

\* Insufficient stems for analysis

Table 3. Woody stem control (percent change) in 1998 Novartis site preparation study – South Carolina

Treatment	Species				Total
	Black Cherry	Plum	Sweetgum		
	----- percent -----				
1	-50 a *	-56 ab	-94 a		-75 ab
2	-42 a	-90 a	0 b		-49 bc
3	-50 a	-19 bc	-50 ab		-39 cd
4	-33 a	-100 a	0 b		-60 abc
5	+33 a	-75 a	-100 a		-74 abc
6	-100 a	-96 a	-100 a		-87 a
7	-35 a	-71 a	-68 a		-59 abc
8	-39 a	-50 abc	-100 a		-13 de
9	-100 a	-100 a	-97 a		-91 a
10	0 a	0 c	-67 a		0 e

\* negative changes indicate a reduction in stems and values followed by the same letter in a column do not differ at P = 0.05

### EFFECTS OF APPLICATION TIMING ON WOODY STEM CONTROL USING DICAMBA TANK MIXTURES. L.R. Nelson and A.W. Ezell. Clemson University, Clemson, SC; and Mississippi State University, Starkville.

#### ABSTRACT

Herbicide treatments were installed during the 1998 growing season at two locations to evaluate effects of application timing on pine and hardwood control using dicamba (Vanquish®) mixed with either imazapyr (Arsenal Applicators Concentrate®), glyphosate (Accord®) or triclopyr (Garlon 4®). Study sites included a piedmont site near Starr, SC and an upper coastal plain site near Starkville, MS. Treatments included dicamba @ 2 qt + glyphosate @ 3 qt product/ac, dicamba @ 2 qt + triclopyr @ 2 qt product/ac and dicamba @ 2 qt + imazapyr @ 16 oz product/ac. Treatments were applied with a CO<sub>2</sub> pole sprayer in mid-June, mid-July and mid-August in South Carolina and at the same times plus a mid-September application in Mississippi. A complete randomized design with three replications was used at both sites. Dominant hardwood species were black cherry, red oak spp. and sweetgum in South Carolina and red maple, red oak spp., swamp chestnut oak and winged sumac in Mississippi. Evaluations were conducted 12 MAT. Reduction of the number of woody stems/ac by species was used as a measure of control.

Significant herbicide treatment and timing effects occurred on hardwoods in South Carolina. Vanquish @ 2 qt + Arsenal @ 16 oz resulted in a 55 % stem reduction of sweetgum compared to a 10 and -18 % reduction with Vanquish @ 2 qt + Accord @ 3 qt and Vanquish @ 2 qt + Garlon 4 @ 2 qt/ac, respectively. July and August applications resulted in approximately 30 % stem reduction of red oak species compared to 1 % with June applications. Effects on other species were not significant.

In Mississippi both treatment and timing effects were significant. Vanquish @ 2 qt + Garlon 4 @ 2 qt provided a 73 % stem reduction of loblolly pine compared to 19 and 21 % for the Arsenal and Accord mixtures, respectively. The Vanquish + Arsenal tank mixture provided 92 % stem reduction of red maple compared to 58 and 47 % for Vanquish mixed with either Accord or Garlon 4, respectively. Both the Arsenal and Accord mixtures provided better than 75 % control of red oak spp. compared to 33 % with the Garlon 4 mixture. Optimum application timing varied by species. June and August applications on loblolly pine were significantly better than July or September applications. June, August and September applications resulted in approximately 80% control of red maple compared to 57% with the July application. June and July applications resulted in 50 to 60 % control of red oaks while stem numbers increased following August and September applications.

**A COMPARISON OF BASAL BARK TREATMENTS USING GLYPHOSATE AND MON 59120.** J.L. Yeiser, Stephen F. Austin State University, Nacogdoches, TX 75962; L.R. Nelson, Clemson University, Clemson, S.C. 29634-1003; and A.W. Ezell, Mississippi State University, Mississippi State, MS39762.

#### ABSTRACT

Monsanto 59120 is a proprietary surfactant potentially providing the water solubility and bark penetration needed by Accord during low-volume, basal bark applications. Dormant and growing season, low-volume basal bark applications of Monsanto 59120+Accord were applied to a height of 14 in. without runoff and assessed for crown reduction of selected woody species in Arkansas, Mississippi, and South Carolina. After two growing seasons, crown reduction was greater for mixtures of Monsanto 59120+Accord than Accord alone. Monsanto 59120+Accord in a 50:50 mixture provided growing season control of pine and sweetgum comparable to the industry check, Garlon 4+vegetable oil (20%+80%). However, Garlon 4+vegetable oil (20%+80%) provided best overall dormant and growing season control across all test species.