

EFFICACY OF MID-ROTATION BRUSH CONTROL APPLICATIONS USING IMAZAPYR AND GLUFOSINATE

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ABSTRACT

A total of 18 treatments were applied to the understory vegetation in a 31-year-old loblolly pine (*Pinus taeda*) plantation. The study site was on the Mississippi State University John Starr Forest in Oktibbeha County, Mississippi. Plots were evaluated at 14, 28, 56, 90, and 120 days after treatment with final evaluation at 1 year after treatment. Control of red oak species (Section *Quercus*) and red maple (*Acer rubrum*) was generally less than desirable unless imazapyr was in the treatment. Glufosinate performed better on white oak species (Section *Lobatae*), persimmon (*Diospyros virginiana*) and subarborescent species. The only treatments which provided desirable levels of control when all hardwood species were considered were those which contained imazapyr alone or those with mixtures of imazapyr and glyphosate.

INTRODUCTION

Mid-rotation brush control has been used more frequently in loblolly pine (*Pinus taeda*) management since the introduction of imazapyr to the market. Both aerial and ground applications are used. The use of ground application permits the addition of other materials which may be desirable if natural pine regeneration or species resistant to imazapyr are to be controlled. Glufosinate has demonstrated potential for use in controlling natural pine, but additional information is needed regarding the efficacy of glufosinate in controlling hardwood species.

METHODS

The study was conducted in a 31-year-old loblolly pine plantation located on the Mississippi State University John Starr Forest in Oktibbeha County, MS. The plantation had been thinned twice and had a well-established understory of 15 hardwood species, 4 subarborescent species, and vines.

A total of 54 plots were utilized in the study. Each plot was a rectangular area 30 feet by 50 feet. The

sample area in each plot was a swath 10 feet by 50 feet centered in the treatment plot.

A total of 18 treatments were utilized in the study (table 1). These included four glufosinate products, two imazapyr products, one glyphosate product, and an untreated check.

All treatments were applied August 23, 2021, using a CO₂-powered backpack sprayer equipped with a pole extension and KLC-9 nozzle. The equipment simulates the application from either a helicopter or skidder. Total spray volume was 30 gallons per acre to reflect the typical application level used in ground applications. Each treatment was replicated three times in a completely randomized design.

All stems of woody species in the sample areas were recorded by species and height class prior to treatment application and 1 year after treatment. Brownout was recorded by vegetation group (grasses, forbs, hardwoods) at 14, 28, 56, 90, and 120 days after treatment. Control is based on the reduction in stems comparing the pretreatment and 1-year-after-treatment data.

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Table 1—List of treatments in 2021 mid-rotation brush control study

Treatment	Herbicide (rate/acre)
1	Untreated check
2	Finale® XL (54.8 ounces)
3	BASF glufosinate (54.8 ounces)
4	Cheetah® Pro (54.8 ounces)
5	Interline (54.8 ounces)
6	Finale® XL (82.2 ounces)
7	BASF glufosinate (82.2 ounces)
8	Cheetah® Pro (82.2 ounces)
9	Interline (82.2 ounces)
10	Chopper® GEN 2 (48.0 ounces)
11	Arsenal® AC (20.0 ounces)
12	Finale® XL (54.8 oz) + Chopper® GEN 2 (48.0 ounces)
13	Finale® XL (54.8 oz) + Arsenal® AC (20.0 ounces)
14	Finale® XL (82.2 oz) + Chopper® GEN 2 (48.0 ounces)
15	Finale® XL (82.2 oz) + Arsenal® AC (20.0 ounces)
16	Accord® XRT II (48.0 ounces)
17	Accord® XRT II (48.0 ounces) + Chopper® GEN 2 (48.0 ounces)
18	Accord® XRT II (48.0 ounces) + Arsenal® AC (20.0 ounces)

All products made by BASF Corporation, Florham Park, NJ.

All treatments included Elite Imperial (19.2 ounces per acre) and Elite Supreme (10.0 ounces per acre).

RESULTS

Control of red oak species, which included cherrybark (*Quercus pagoda*), water (*Q. nigra*), willow (*Q. phellos*), and Shumard (*Q. shumardii*) oaks was generally less than desirable unless imazapyr was included in the treatment (table 2). Control of red maple was very low unless imazapyr was included in the treatment. Glufosinate alone provided better control on white oak species including white (*Q. alba*) and post (*Q. stellata*) oaks, and persimmon, but overall best results were for treatments containing imazapyr. While not the primary target of mid-rotation brush control applications, most of the treatments in the study provided good to excellent control of subarborescent species in the plots. Of principal interest in mid-rotation brush control

applications is total control resulting from the treatment. In this consideration, only those treatments containing the imazapyr alone (treatments 10 and 11) and those with imazapyr and glyphosate (treatments 17 and 18) provided desirable levels of control. An item of concern was the reduction in total control, which was observed in treatments which had glufosinate added to the imazapyr (treatments 12, 13, 14, and 15) as compared to the treatments with imazapyr alone on those with imazapyr and glyphosate. Additional testing is being conducted to further evaluate the latter observation.

Table 2—Percentage of stem reduction in 2021 mid-rotation brush control study

Treatment	RED	REM	PER	WHO	SUB	Total
1	23.0de	+16.7e	+16.7e	—	18.1e	0.0f
2	+12.5f	+24.3e	33.3d	100.0a	82.4b	29.0e
3	0.0e	+13.8e	0.0e	100.0a	74.6c	+7.2f
4	7.1e	45.0d	—	—	60.2d	23.3ef
5	20.6de	14.1d	73.7bc	75.0b	27.6e	27.7e
6	29.4de	17.0d	75.0bc	80.0b	63.6d	29.0e
7	50.0d	15.0d	100.0a	100.0a	84.8b	38.6e
8	100.0a	+40.0f	57.1c	—	73.2c	20.0ef
9	+66.7f	3.3d	84.6b	100.0a	42.5e	32.7e
10	100.0a	100.0a	100.0a	100.0a	89.6ab	100.0a
11	95.7a	96.6a	100.0a	100.0a	87.7ab	97.8a
12	91.3a	70.6c	60.0c	100.0a	100.0a	81.7b
13	66.7d	100.0a	100.0a	100.0a	91.1a	82.1b
14	100.0a	85.3b	100.0a	100.0a	95.8a	78.9b
15	93.3a	69.2c	100.0a	100.0a	92.4a	84.1b
16	85.7b	68.4c	100.0a	—	98.8a	76.7b
17	100.0a	89.6ab	100.0a	100.0a	97.7a	96.1a
18	100.0a	100.0a	100.0a	—	100.0a	95.3a

See table 1 for treatment descriptions.

Values in a column followed by the same letter do not differ at $\alpha = 0.05$.

— = insufficient stems for analysis.

+ = increase in stems.

RED = red oaks (cherrybark, water, willow, shumard); REM = red maple; PER = persimmon; WHO = white oaks (white, post); SUB = subarborescents (winged sumac, American beautyberry, Devil's walkingstick, Chinese privet); Total = all hardwood species (no subarborescents).