USE OF GLUFOSINATE TO CONTROL NATURAL PINES—A POSSIBLE REPLACEMENT FOR GLYPHOSATE

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ABSTRACT

Recent concerns over the use of glyphosate have prompted land managers to seek a replacement for that herbicide. Two treatments containing glufosinate (Finale VU) were compared to one treatment without glufosinate and an untreated check. The primary focus was the control of naturally occurring loblolly pine. All treatments were replicated three times in a completely randomized design. After 8 months, all herbicide treatments demonstrated excellent control of loblolly pine. Based on this pilot study, glufosinate appears to have good potential for control of loblolly pines.

INTRODUCTION

Site preparation continues to be the largest forestry vegetation management effort in the South. While most species encountered in these situations can be effectively managed at this time, control of natural pines continues to be a challenge. Recent concerns over the use of glyphosate have further complicated the situation. As a result, some forest managers are seeking a replacement for glyphosate in site preparation applications. In addition to effective chemicals, land managers have sought ways to expand the application window for chemical site preparation. Thus, any information on the efficacy of glufosinate and mid-summer application would be a useful addition to the current body of knowledge.

OBJECTIVES

The objectives of this study are as follows:

1. To evaluate the efficacy of Finale VU® (glufosinate) in the control of natural loblolly pines (*Pinus taeda*) and hardwoods
2. To evaluate the July timing of site preparation applications for control of natural pines and hardwoods

METHODS

Study Site

The study was installed on a Tennessee Valley Authority right-of-way in Oktibbeha County, Mississippi. The site was selected due to the presence of naturally occurring loblolly pines which were 1 to 10 feet tall. A variety of hardwood species were also found across the site.

Treatments

A list of treatments is found in table 1. The overall thrust of the study was to determine if glyphosate could be effectively replaced by glufosinate.

Experimental Design

The study utilized a completely randomized design. Three replications of each treatment were installed and evaluated.

Application

All treatments were applied on July 15, 2019. A CO2-powered backpack sprayer with pole extension and KLC-9 nozzle were used to simulate an aerial application. Total spray volume was 10 gallons per acre (10 GPA).

Table 1—List of treatments in 2019 glufosinate study

1. Untreated check
1. Arsenal AC (20 ounces per acre) + Accord XRTII (4 quarts per acre) + Detail (2 ounces per acre) + MSO (1 percent v/v)
2. Arsenal AC (20 ounces per acre) + Accord XRTII (2.5 quarts per acre) + Finale VU (1.5 quarts per acre) + Detail (2 ounces per acre) + MSO (1 percent v/v)
3. Arsenal AC (20 ounces per acre) + Accord XRTII (3 quarts per acre) + Finale VU (1 quart per acre) + Detail (2 ounces per acre) + MSO (1 percent v/v)

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Evaluation

Treatment plots were rectangular areas which measured 30 feet x 50 feet. Rebar was placed at the plot center on each end of the plot and nylon string was connected to the rebar to establish the plot midline. All woody stems in a sample area 10 feet x 50 feet centered in the treatment plot were recorded by species and height class prior to application. Brownout was recorded at 30 days after treatment (DAT) and percent control was recorded at 90 DAT. Pine control was recorded at 8 months after treatment (MAT).

RESULTS

All herbicide treatments provided good to excellent brownout at 30 DAT (table 2). Herbaceous plants typically exhibit brownout response to herbicide treatments faster than woody species, and hardwoods are slower to respond than pines in most applications. There was very little difference between the brownout of vegetation groups in Treatments 2 and 4. Less brownout was observed on hardwoods in Treatment 3, and this was attributed to the increased number of green ash (*Fraxinus pennsylvanica*) stems which occurred in these plots.

Overall control in the herbicide plots could be considered excellent at 90 DAT, but hardwood response in Treatment 3 continued to lag behind the control observed in Treatments 2 and 4 (table 3). Of greater interest was the control of pines which ranged from 96.0 to 99.3 percent among the herbicide treatments.

The evaluation of control at 8 MAT was restricted to only pines as this timing (March) may have been prior to some hardwoods breaking dormancy. Pine control at 8 MAT was excellent in all herbicide treatments (table 4). Control at this timing was based on both "stems" (number living at 8 MAT vs. number recorded prior to application) and "heights" (the cumulative heights of all living pines vs. the

Table 2—Average brownout at 30 DAT by treatment and vegetation group (average all replications)

Treatment	Vegetation group			
	Grass	Forbs	Pine	Hardwoods
	percent			
Untreated	5.0	1.0	0.0	0.0
A + Ac (4) + D + M	90.0	95.0	93.3	66.7
A + Ac (2.5) + F (1.5) + D + M	80.0	93.3	90.0	46.7
A + Ac (3) + F (1) + D + M	93.3	96.0	95.0	56.7

DAT=days after treatment.

Table 3—Average control at 90 DAT by treatment and vegetation group (average all replications)

Treatment	Vegetation group			
	Grass	Forbs	Pine	Hardwoods
	percent			
Untreated	4.3	5.0	0.0	5.3
A + Ac (4) + D + M	100.0	98.0	99.3	100.0
A + Ac (2.5) + F (1.5) + D + M	99.0	98.0	96.0	63.3
A + Ac (3) + F (1) + D + M	100.0	97.3	97.7	91.7

DAT=days after treatment.

Table 4—Average reduction in pine stems and cumulative heights at 8 MAT by treatment (average all replications)

Treatment	Stems	Heights
	-percent-	*-percent-*
Untreated	0.0	+6.3[a]
A + Ac (4) + D + M	100.0	100.0
A + Ac (2.5) + F (1.5) + D + M	97.8	99.6
A + Ac (3) + F (1) + D + M	100.0	100.0

[a]Plus sign indicates an increase in total heights.

cumulative heights of pines recorded prior to application). While Treatment 3 had slightly less (1-2.2 percent) control than Treatments 2 and 4, all treatments were considered to be successful.

SUMMARY

Can Finale VU® (glufosinate) replace glyphosate? Results from this pilot study indicate that this material has very good/excellent potential for the control of natural pine. The July applications provided excellent results. Mid-summer applications in previous work have typically demonstrated lower control but it would be difficult to improve the pine control in this study. It was also notable that excellent pine control was obtained with 10 GPA. Most pine control work is complete with 15 GPA in operational settings. All herbicide treatments in this study included Detail® (saflufenacil). This material is known to increase the control of pines using glyphosate. Future work with glufosinate may evaluate applications without the addition of saflufenacil. Additional testing will be required to fully evaluate the use of glufosinate in site preparation.