A COMPARISON OF GLUFOSINATE PRODUCTS FOR THE CONTROL OF NATURAL PINES

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ABSTRACT

A total of 15 treatments were applied to wilding loblolly pines (*Pinus taeda*) on two utility right-of-way sites. One site was sprayed in July and the second site was sprayed in September. Five different glufosinate products were included in the treatments. Total spray volume of 15 gallons per acre and three replications of all treatments were utilized at both sites. Brownout was evaluated at 14, 28, and 56 days after treatment. Pine control was evaluated at 1 year after treatment. Pine control ranged from 98.4 to 100.0 percent among the treatments. There was no significant difference among the glufosinate products for pine control at either site. Glufosinate exhibits excellent potential for the control of natural pines in forestry site preparation applications.

INTRODUCTION

Site preparation continues to be the largest use of herbicides in forestry applications in the Southeastern United States. One of the major challenges on many sites is the control of natural pines. These pines can range from 6 inches to 6 feet in height and may be encountered in many thousands of stems per acre. Concerns over the use of glyphosate have resulted in many land managers seeking a substitute material that would be effective in controlling natural pines. Glufosinate is a chemical that has shown promise for such applications.

METHODS

The study site for the July applications was an electric utility right-of-way in Oktibbeha County, MS. The site was well stocked with natural loblolly pines 1–6 feet tall with the majority being 1–3 feet tall. The average number of pines on this site was 9,300 per acre. The study site for the September applications was also an electric utility right-of-way in Oktibbeha County, MS. The site had dense pine coverage of seedlings in the 1-foot height class with the average number of pines being 230,490 per acre.

A total of 45 plots were utilized at each site. Each plot was a rectangular area 30 feet by 50 feet. The sample area for the July treatment plots was a swath 10 feet by 50 feet centered in the treatment plot. Pine sampling for the September plots was completed using three circular subplots located along the center line of the treatment plot. Each subplot was marked with a pin flag at the center and had a 1-foot radius.

A total of 15 treatments were utilized in the study (table 1). The same treatments were applied on both sites and included five different glufosinate products, one imazapyr product, one glyphosate product, and three products being tested to evaluate the potential to enhance the performance of the glufosinate.

The July treatments were applied July 28, 2021, using a CO_2-powered backpack sprayer equipped with a pole extension and KLC-9 nozzle. This equipment simulates aerial application. September treatments were applied September 24, 2021, using the same equipment. Total spray volume was 15 gallons per acre for all applications and all treatments were replicated three times.

All pines in the sample areas were recorded by height class prior to treatment application and

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Table 1—List of treatments and percentage reduction in the number of loblolly pine seedlings at 1 year after treatment by application timing

Treatment	Herbicide (rate per acre)	July	September
1	Untreated	+64.3d	20.6b
2	Chopper GEN2® (48 ounces)	1.1c	28.8b
3	Finale® VU (150 ounces)	100.0a	100.0a
4	Finale® XL (64 ounces)	100.0a	100.0a
5	Numbered Glufosinate Cpd. (64 ounces)	100.0a	100.0a
6	Cheetah® Pro (64 ounces)	100.0a	100.0a
7	Interline® (64 ounces)	100.0a	100.0a
8	Accord® XRT II (64 ounces)	83.5b	100.0a
9	Finale® XL (64 ounces) + Detail® (2 ounces)	100.0a	100.0a
10	Finale® XL (64 ounces) + Numbered Enhancer Cpd. (1.83 ounces)	98.9a	100.0a
11	Finale® XL (64 ounces) + Ammonium Sulfate (3 pounds)	100.0a	100.0a
12	Finale® XL (64 ounces) + Chopper GEN2® (48 ounces)	98.4a	100.0a
13	Numbered Glufosinate Cpd. (64 ounces) + Chopper GEN2® (48 ounces)	100.0a	100.0a
14	Cheetah® Pro (64 ounces) + Chopper GEN2® (48 ounces)	98.9a	100.0a
15	Interline® (64 ounces) + Chopper GEN2® (48 ounces)	100.0a	100.0a

All treatments had Velocity (2 ounces per acre) and Elite Supreme (0.25 percent volume to volume) added.
Values in a column followed by the same letter do not differ significantly at $\alpha = 0.05$.
+ = an increase in stems.
Chopper GEN2® (BASF, Florham Park, NJ) is imazapyr.
Finale® VU (BASF, Florham Park, NJ) is glufosinate-ammonium.
Finale® XL (BASF, Florham Park, NJ) is glufosinate-ammonium.
Cheetah® Pro (Nufarm, Laverton North, Victoria, Australia) is glufosinate-ammonium.
Interline® (United Phosphorus, Inc., King of Prussia, PA) is glufosinate-ammonium.
Accord® XRT II (Corteva Agriscience, Indianapolis, IN) is glyphosate.
Detail® (BASF, Florham Park, NJ) is saflufenacil.

1 year after treatment (1 YAT). Brownout was recorded at 14, 28, and 56 days after treatment (DAT). Pine control was based on the reduction in the number of stems based on a comparison of the pretreatment and 1 YAT data.

RESULTS

July Treatments

The July application date represents a potential extension of the site preparation window in the Southeastern United States, which is generally considered to be August through December, depending on location. Pine response to the glufosinate treatments was rapid with significant brownout noted at 7 DAT. The brownout was thorough and consistent at the 14, 28, and 56 DAT evaluations. Very little or no control of pines was expected in the untreated or Chopper GEN2®-only treatments (treatments 1 and 2) and such a response was observed (table 1). There was no significant difference in pine control among the different glufosinate products (treatments 3 through 7), all of which provided 100 percent control. With control this high, it is understandable that the three products being tested for enhancing the glufosinate performance did not improve control (treatments 9 through 11). The very slight reduction in pine control in treatments of mixtures of glufosinate and imazapyr is attributed to the occasional shading of a small pine by larger vegetation. A significant difference in pine control was observed in the glyphosate treatment (treatment 8), but it should be noted that the rate per acre was only 64 ounces. Glyphosate is typically applied at 128 ounces per acre (or more) in site preparation work.

September Treatments

Again, the untreated and Chopper GEN2®-only treatments had much less control and the reduction in pine seedlings in these plots was attributed to natural mortality, which is expected in dense populations of small seedlings (table 1). There was no difference in pine control among treatments using different glufosinate products. All provided 100 percent control applied alone or in mixtures with other products. The glyphosate treatment (treatment 8) also provided 100 percent control of these small seedlings, which were fully exposed.

CONCLUSIONS

Glufosinate demonstrated excellent potential for control of natural pine seedlings when applied at the rates utilized in this study. All glufosinate products tested in this work performed equally well and no difference in control was observed when comparing the two application timings. While these results are encouraging, additional testing is needed to fully evaluate the efficacy of glufosinate for control of hardwood species.