

A COMPARISON OF GARLON® 4 ULTRA, GARLON® XRT, VISTA® XRT, VASTLAN®, CHOPPER GEN2®, FREELEXX® OUST® EXTRA, AND TERRAVUE® IN SITE PREPARATION APPLICATIONS

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ABSTRACT

Site preparation continues to be a major focus of vegetation management programs in pine (*Pinus* spp.) plantation management in the South. Evaluation of new products applied alone or in mixture must be completed to test cost efficacy. In this study, 10 treatments (including an untreated control) were applied to a recent cutover area in northern Mississippi. All treatments were replicated three times in an October 2021 application. Plots were evaluated at 4 months after treatment (MAT), 8 MAT, and 1 year after treatment. Results indicate that most tested mixtures provided excellent control of hardwoods, except hickory (*Carya* spp.). Greatest efficacy was observed in treatment plots containing higher rates of Chopper GEN2®.

INTRODUCTION

Chemical site preparation is a critical step in establishment of southern pine (*Pinus* spp.) plantations. While cost efficacy is always a consideration, in recent history, class action lawsuit settlements over perceived glyphosate concerns have resulted in a push to use different herbicide compounds in forest management efforts. Chemical site preparation is the largest end use for herbicides in forestry. Consequently, there is strong interest in using new herbicide formulations as alternatives to glyphosate in this role.

Different competition scenarios require different mixtures for optimal results. New herbicide formulations offer the chance to evaluate new possibilities for site preparation tank mixtures as land managers attempt to develop alternative cost-efficient treatment alternatives. The objective of this study was to evaluate efficacy of different herbicide mixtures for control of hardwoods in site preparation applications.

METHODS

The study was installed on the Mississippi State University, John Starr Memorial Forest near Starkville, MS. The site was harvested 1 year prior to study installation. Soil series was Falkner silt loam with an average pH of 5.3. Hickory (*Carya* spp.) was the dominant woody genus onsite with oak (*Quercus* spp.), red maple (*Acer rubrum*), and common persimmon (*Diospyros virginiana*) in sufficient quantities for testing. The stems ranged between 6 inches and 5 feet in height. Other woody and herbaceous species made up a minor vegetative component.

A complete list of treatments is found in table 1. Plots were rectangular areas measuring 10 feet by 100 feet, marked at each end by vinyl pin flags with string stretched along the plot midline between pin flags. Treatments were applied using a CO₂-powered backpack sprayer with pole extension and a KLC-9 spray tip to simulate aerial spraying. Total spray volume was 10 gallons per acre and all treatments were applied October 7, 2021.

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Table 1—List of treatments applied in 2021 Corteva site preparation study

Treatment	Herbicide (rate per acre)
1	Garlon® 4 Ultra (32 ounces) + TerraVue® (2.85 ounces) + Chopper GEN2® (32 ounces)
2	Vastlan® (32 ounces) + TerraVue® (2.85 ounces) + Chopper GEN2® (32 ounces)
3	Garlon® XRT (60 ounces) + TerraVue® 2.85 ounces) + Chopper GEN2® (16 ounces)
4	Garlon® XRT (21 ounces) + TerraVue® (5.7 ounces) + Chopper GEN2® (16 ounces)
5	Vista® XRT (21 ounces) + TerraVue® (2.85 ounces) + Chopper GEN2® (32 ounces)
6	Vista® XRT (21 ounces) + Vastlan® (32 ounces) + Chopper GEN2® (32 ounces)
7	Freelexx® (128 ounces) + TerraVue® (2.85 ounces) + Chopper GEN2® (32 ounces)
8	Oust® Extra (4 ounces)
9	Untreated check
10	Garlon® XRT (60 ounces) + Chopper GEN2® (32 ounces) + Oust® Extra (4 ounces)

Chopper GEN2® (BASF, Florham Park, NJ) is imazapyr.

Garlon® 4 Ultra and Garlon® XRT (Corteva Agriscience, Riverside, CA) are triclopyr ester.

TerraVue® (Corteva Agriscience™, Riverside, CA) is aminopyralid + floryprauxifen-benzyl.

Vastlan® (Corteva Agriscience™, Riverside, CA) is triclopyr choline.

Vista® XRT (Corteva Agriscience™, Riverside, CA) is fluroxypyr.

Freelexx® (Corteva Agriscience™, Riverside, CA) is 2,4-D choline.

Oust® Extra (Bayer CropScience, St Louis, MO) is sulfometuron methyl + metsulfuron methyl.

Vegetation assessments were completed on a sample area 10 feet by 80 feet centered in the treatment plot. Prior to treatment, hardwood seedlings were identified to species and recorded by 1-foot height classes. Control was evaluated at 4 months after treatment, 8 months after treatment, and finally, 1 year after treatment.

Treatments were replicated three times in a randomized complete block design. Cumulative heights were calculated by multiplying the number of stems by respective height classes. Percent brownout averages were calculated and are presented herein. Percent values were arcsine transformed, but for ease of interpretation, actual values are presented. Means separation was performed using Duncan's New Multiple Range Test at $\alpha = 0.05$.

RESULTS

Average percentages of control 1 year after treatment are presented in table 2. Land managers expect to obtain ≥ 90.0 percent control of hardwood stems when employing chemical site preparation and none of the treatments tested provided this level of control on hickory. Excepting treatments 8 and 9 (35.7 and 37.2

percentage of control, respectively), control of oak was good ranging from 85.7 to 100.0 percent. It is noteworthy that plots receiving treatments 3 and 4 Chopper GEN2® at 16 ounces compared to 32 ounces in treatments 1, 2, 5 through 7, and 10) exhibited less control. This is not unexpected and correlates to the industry standard of 40–48 ounces of Chopper GEN2® in site preparation tank mixes.

With the exception of treatments 8 and 9, all treatments provided 100.0 percent control of red maple. Similar results were observed for common persimmon and subarborescent species with control of 92.3 percent observed in persimmon and ≥ 81.0 percent control noted in subarborescents. Adequate control was not expected from treatments 8 or 9 for any of the species tested in this study.

CONCLUSIONS

Chemical site preparation has a decades-long standing of use in pine plantation establishment and will continue to be utilized in most of these efforts in the South for the foreseeable future. As new product development offers different herbicide formulations, it is important to learn

Table 2—Percentage of control averages of hardwood groups in 2021 Corteva site preparation study at 1 year after treatment

Treatment	Hickory	Oak	Red maple	Persimmon	Subarborescents	Total
1	41.5c	100.0a	100.0a	100.0	97.1a	77.9b
2	39.2c	92.3a	100.0a	100.0	91.2a	77.4b
3	62.2b	87.2ab	100.0a	92.3	91.1a	78.0b
4	63.0b	85.7b	100.0a	93.8	90.0a	84.4ab
5	40.9c	100.0a	100.0a	100.0	93.1a	90.8a
6	81.8a	95.8a	100.0a	100.0	95.3a	95.2a
7	NA	NA	100.0a	NA	81.0b	83.9ab
8	48.3c	35.7c	18.9c	NA	45.7c	38.5c
9	0.0d	37.2c	71.7b	NA	+22.3d	26.6c
10	83.0a	100.0a	100.0a	100.0	99.2a	91.1a

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

NA = insufficient stems for analysis.

+ indicates an increase in stems.

how site preparation efficacy can vary depending on what species are targeted for control. Though several of the mixtures in this study provided excellent control of most hardwood species, overall hardwood control was strongly influenced by the lack of hickory control. Other herbicides should be considered for sites where hickory is of concern for site preparation work. Finally, if Chopper GEN2® is used, control of oak will be substantially greater with rates exceeding 16 ounces per acre.