Auburn University Southern Forest Nursery Management Cooperative

RESEARCH REPORT 99-8

OXYFLUROFEN: FEASIBILITY AS A PRE-EMERGENT HERBICIDE FOR OAK SEEDBEDS

by
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INTRODUCTION

Oxyflurofen, (Goal®) belongs to the diphenylether family of herbicides and has the potential to be an effective weed control chemical when applied pre-emergent to large seeded species such as oaks. Oak seed germination characteristics protect the meristem throughout the germination process from contacting the barrier of oxyflurofen on the soil surface. Once germinating seedlings move through this barrier however, and cotyledons become exposed, Goal application will cause crop injury. The use of Goal on oak seedbeds is therefore restricted to a one-time application immediately following sowing. It is not currently labeled for hardwood species in forest tree nurseries. In order to obtain a label, the manufacturer requires crop safety data for as many soil and climatic conditions as possible. The objective of this study was to obtain supportive data for labeling Goal on fall and spring sown oaks.

METHODOLOGY

Field experiments were installed at one Alabama and one Texas nursery site during the 1998-99 growing season. The fall applications were made on two oak species, live oak (*Quercus virginiana*) and bur oak (*Quercus macrocarpa*) at the Texas site. Spring applications of Goal were made on cherrybark oak (*Quercus falcata var. pagodifolia*), nuttall oak (*Quercus nuttallii*), and willow oak (*Quercus phellos*) at the Alabama nursery.

Treatment plots (4 ft by 10 ft) were laid out in a randomized complete block design with four replications for each species and nursery. Herbicide treatments were applied immediately following sowing and mulching, then irrigated with one half inch of water. Goal 2XL (22% active) was mixed

in 3.8 L (1 gallon) of water and applied with a CO^2 powered hand sprayer at the following rates of the active ingredient: 0.25 oz/ac, 0.50 oz/ac, 1.00 oz/ac, and 0 oz/ac.

Two measurements were taken for each plot. First, a germination count using a (1' x 4') counting frame was made in late May or early June. The number of live seedlings in two randomly located frames were counted. Second, a whole seedling harvest was made on all seedlings present in a randomly located counting frame in November. Following whole seedling harvest, a random sample of 25 seedlings from this group were measured for height, diameter, and oven dry weights.

RESULTS

Applications of oxyflurofen to oak seedbeds exhibited no indication of injury at either study location, application time, or oak species included in this study. The morphological measurements for fall applications and species at the Texas study location can be found in Table 1. Results from both species of fall sown oaks do not show any significant differences between any of the parameters evaluated at the Texas study location.

Table 1. Morphological characteristics for fall sown live oak, and bur oak eight months after sowing on 11/10/97 and application of Goal 2XL herbicide on 11/12/97. There were no significant differences between treatments for any variable ($\propto$=.05).

Treatment (pints/ac Product)	Density (No./ft^2)	Root Collar Diameter (mm)	Shoot Height (cm)	Dry Wt./ seedling (g) Root	Shoot	Total
Live Oak						
0	16 a	4.80	30.5	8.7	6.0	14.7
1	14 a	5.21	28.8	8.9	6.2	15.1
2	16 a	4.93	30.8	8.5	6.3	14.8
4	14 a	4.64	28.8	7.6	5.4	13.0
Bur Oak						
0	11 a	6.52	25.1	11.9	9.8	21.7
1	11 a	6.51	24.9	12.2	9.5	21.7
2	9 a	6.60	26.6	13.8	11.0	24.8
4	13 a	6.23	25.5	14.1	11.7	25.8

Results for the Alabama study are presented in Table 2. Although we did not collect weed control data, Goal treatments produced seedlings larger than the control, most likely due to less weed competition in the early stages of development. Future studies should include an inventory of weed control to evaluate this effect.

Table 2. Morphological characteristics for spring sown cherrybark oak, nuttall oak, and willow oak eight months after sowing on 4/6/98 and application of Goal 2XL herbicide on 4/6/98. Variable means followed by the same letter within a species are not significantly different at the .05 level.

Treatment (pints/ac Product)	Density (No./ft^2)	Root Collar Diameter (mm)	Shoot Height (cm)	Dry Wt./ seedling (g) Root	Shoot	Total
Cherrybark Oak						
0	27 a	4.58 b	46.0 b	3.7 a	4.6 a	8.3 b
1	25 a	4.88 ab	50.5 a	4.0 a b	5.3 a	9.3 ab
2	28 a	4.99 ab	54.1 a	3.8 a b	5.7 a	9.5 ab
4	26 a	5.04 a	50.2 a	4.3 a	5.8 a	10.1 a
Nuttall Oak						
0	17 a	7.69 b	69.4 a	3.6 a	9.6 a	13.2 a
1	14 b	8.17 a	71.9 a	4.1 a	10.0 a	14.1 a
2	15 ab	8.08 ab	70.9 a	4.0 a	11.0 a	15.0 a
4	13 b	7.89 ab	69.4 a	4.0 a	10.0 a	14.0 a
Willow Oak						
0	8 a	6.45 a	71.5 a	4.3 b	9.3 b	13.6 b
1	10 a	7.60 a	76.2 a	6.8 a	14.1 ab	20.9 a
2	11 a	7.57 a	71.9 a	6.1 ab	15.4 a	21.5 a
4	12 a	7.14 a	72.2 a	5.5 ab	13.1 ab	18.6 b

MANAGEMENT IMPLICATIONS

This experiment was intended to obtain the necessary data to support a national label for Goal for a one-time application over oak seedbeds. These results indicate that Goal applied to oak seedbeds exhibits crop tolerance and safety for oaks which also supports the field observations of many nursery managers. This data will be used to support a Goal label for large seeded hardwoods to the extent the manufacturer will support it.