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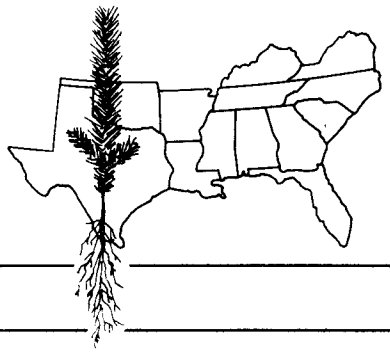

RESEARCH NOTE 96-1

Results of Testing Nine Herbicides for Seven Tree Species Using a Rapid Screening Technique

by
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INTRODUCTION:

Weed control in hardwood nurseries in currently dependent upon fumigation, mechanical methods, hand weeding, and directed sprays of glyphosate. Preemergent applications of napropamide, oxyfluorfen, and others are also used for some species. Sethoxydim and fluazifop-butyl may also be used in hardwood nurseries for grass control. Yet, each of these techniques have their disadvantages and most hardwood nursery managers do not feel that current weed control options are adequate. However, screening herbicides for use in hardwood nurseries is complicated by the large number of species involved and the large number of chemicals that are potentially useful for weed control. In addition, the many species of hardwoods range across several genera that may be quite different in seed physiology, germination characteristics, root morphology, and growth patterns. Because of these differences it is unlikely that a single herbicide or even a single family of herbicides will be suitable.

Chemical manufacturers commonly employ rapid screening procedures to test a large number of chemicals across many species by using a conveyor type sprayer that can accurately apply chemicals to a greenhouse flat or even a single pot. This system was used to obtain some preliminary data on the feasibility of specific herbicides for commonly planted hardwoods.

METHODOLOGY:

Nine herbicides and seven species were selected for this study (Table 1). Seed (either 25 or 50) were sown in rows in galvanized metal flats 34 x 36 x 8 cm filled with a loamy sand soil.

TABLE 1. Chemical, rates and species tested.

CHEMICALS		RATE
Barricade	(prodiamine)	3 lb Prod/ac
Cobra	(lactofen)	12 oz
Devrinol	(napropamide)	2 lb
Goal	(oxyfluorfen)	4 pts
Predict	(norflurazone)	2.5 lb
Stakeout	(dithiopyr)	6 lb
Stomp	(pendimethelin)	3 qts
Surflan	(oryzalin)	4 qts
Visor	(thiazapyr)	6 lbs

SPECIES

Bald cypress, Cherrybark oak, Green ash, Loblolly pine, Overcup oak, Sweetgum, and White oak

The soil had been fumigated under a plastic tarp with methyl-bromide from small hand-held canisters. Four species were sown per flat. After sowing, the flats were passed through a conveyer belt sprayer to apply the appropriate chemical. The treated flats were then placed in a greenhouse for observation. Flats were watered as necessary, usually once per day, using a hose with a sprinkler head. Germination counts were made at 4 weeks and 12 weeks. Seedling heights were measured at 12 weeks.

RESULTS:

Poor seed quality is a common complaint regarding hardwood nursery culture. This test was no different as the overall percent germination for Sweetgum, Green Ash, Cherrybark, Oak, Overcup oak, and White oak was 16%, 37%, 57%, 36%, and 4%, respectively (Table 2). White oak was not used for any subsequent analysis. Germination for the Loblolly and Baldcypress was 89% and 39%, respectively. Germination of Loblolly in excess of the control plot is most likely due to inaccurate seed counting for some treatments (ie. more than 50 seed were sown per treatment)..

Both seedling counts and height are necessary for assessing chemical selectivity. In some cases germination was not affected, while height growth was reduced. The opposite was seen when germination was affected more than height development (Predict on Baldcypress for example). Generally speaking, selectivity for Loblolly fell out as can be expected with the worst chemicals being Predict, Stakeout, Vision, Barricade, and Devrinol.

There were several interesting positive results:
Loblolly - positive results for Surflan and Stomp
Baldcypress - The new chemical Stakeout, Cobra, and Stomp gave positive results
Sweetgum - There were no consistent performers for sweetgum, but Surflan, Stomp, and Cobra showed positive results.
Green ash - Only Surflan was consistent between germination and height, even so, height did not do as well as the control.
Cherrybark - Cobra and Stomp were the two most consistent performers. Cherrybark was surprisingly tolerant of Predict.
Overcup - Devrinol, Goal, Stomp, and Cobra were fairly consistent between germination and height.

MANAGEMENT IMPLICATIONS:

This experiment was not intended to be directly applicable to the field. Although these results may provide information relative to the suitability of a particular chemical for a particular species, specific recommendations are not possible. These results do indicate, however, that the technique can be employed as part of a screening process because it is relatively quick, inexpensive, and is generally consistent with field observations. Possible improvements in the technique would include more replications (i.e. flats) with more accurate seed counting.

TABLE 2. Results at 4 and 12 weeks after sowing in flats.

Sweetgum

	4 WEEK SEEDLING COUNT			12 WEEK SEEDLING HEIGHT	
		% of control			cm
1	Control	100[a]	1	Control	5.3
2	Surflan	91	2	Stakeout	4.5
3	Stomp	84	3	Surflan	4.2*
4	Cobra	66	4	Stomp	3.8*
5	Devrinol	56	5	Cobra	3.4*
6	Predict	25	6	Goal	1.5*
7	Goal	19	7	Barricade	1.0*
8	Stakeout	16	8	Devrinol	.8*
9	Visor	12	9	Visor	0*
10	Barricade	3	10	Predict	0*

(a) actual germination = 16% (* different from the control at a .05 significance level)

Green ash

		% of control			cm
1	Control	100[a]	1	Control	8.1
2	Predict	38	2	Surflan	6.6*
3	Visor	35	3	Stomp	5.6*
4	Surflan	34	4	Cobra	4.7*
5	Stakeout	31	5	Visor	4.7*
6	Goal	24	6	Goal	4.5*
7	Stomp	19*	7	Stakeout	4.1*
8	Cobra	14*	8	Devrinol	4.0*
9	Devrinol	8 *	9	Barricade	3.2*
10	Barricade	5 *	10	Predict	0*

(a) actual germination = 37%

Loblolly pine

		% of control			cm
1	Visor	129	1	Control	7.0
2	Stakeout	120	2	Cobra	6.7
3	Surflan	103	3	Surflan	6.0*
4	Control	100[a]	4	Stomp	5.6*
5	Stomp	98	5	Goal	5.3*
6	Goal	58	6	Devrinol	5.0*
7	Cobra	53	7	Barricade	4.8*
8	Barricade	35*	8	Visor	4.6*
9	Devrinol	32*	9	Stakeout	3.6*
10	Predict	26*	10	Predict	2.6*

(a) actual germination = 89%

TABLE 2. Contd.

Baldcypress

	4 WEEK SEEDLING COUNT			12 WEEK SEEDLING HEIGHT	
		% of control			cm
1	Control	100[a]	1	Control	14.6
2	Visor	92	2	Stakeout	14.4
3	Stakeout	88	3	Cobra	14.4
4	Stomp	82	4	Predict	13.8
5	Surflan	78	5	Stomp	12.9
6	Cobra	55*	6	Visor	12.8
7	Goal	48*	7	Devrinol	12.6
8	Barricade	42*	8	Barricade	12.0
9	Devrinol	30*	9	Surflan	11.5*
10	Predict	25*	10	Goal	9.3*

(a) actual germination = 36%

Cherrybark oak

		% of control			cm
1	Control	100[a]	1	Stomp	9.4
2	Cobra	93	2	Visor	8.7
3	Predict	88	3	Control	8.6
4	Goal	74	4	Cobra	7.7
5	Stomp	65	5	Predict	7.2*
6	Devrinol	58	6	Barricade	7.1*
7	Surflan	44	7	Surflan	6.8*
8	Barricade	21*	8	Goal	6.7*
9	Visor	14*	9	Stakeout	6.4*
10	Stakeout	0*	10	Devrinol	5.6*

(a) actual germination = 57%

Overcup oak

		% of control			cm
1	Control	100[a]	1	Control	11.4
2	Devrinol	97	2	Goal	10.8
3	Goal	97	3	Cobra	10.3
4	Stomp	89	4	Stomp	10.0*
5	Predict	81	5	Devrinol	9.3*
6	Cobra	75	6	Barricade	9.2*
7	Surflan	75	7	Visor	9.0*
8	Barricade	53	8	Stakeout	8.5*
9	Visor	19*	9	Surflan	8.1*
10	Stakeout	5*	10	Predict	7.5*

(a) actual germination = 36%