

HPPD Herbicide Screening on Seed Crops

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Abstract

A field trial was conducted to screen three HPPD-inhibitor herbicides in order to investigate their potential for use on specialty crops grown in central Oregon. Pre-emergence treatments of mesotrione and isoxaflutole and postemergence treatments of topramezone were applied to Kentucky bluegrass, rough bluegrass, carrot, and onion. Carrot and onion had no tolerance to any of the herbicide treatments. Kentucky and rough bluegrasses showed varying degrees of injury. All three of these herbicides controlled a wide spectrum of common broadleaf weeds. Given further study and the high levels of weed control from this class of herbicides, it may be possible that lower rates of these herbicides could be used selectively in Kentucky and rough bluegrasses.

Introduction

Herbicides that inhibit pigment development at a new site of action in plants are becoming commercially available. These herbicides are described as HPPD inhibitors because of the enzyme that is blocked in susceptible species. The use of these herbicides has recently become common in corn and soybean production systems. Little information exists in the literature about the tolerance of specialty crops to the HPPD-inhibitor herbicides. The objective of this trial was to screen three of the commercially available HPPD inhibitors to investigate their potential for use on specialty crops grown in central Oregon.

Materials and Methods

A field trial was conducted at the Central Oregon Agricultural Research Center near Madras, Oregon. Three rows each of four crop species were planted on September 9, 2006: Kentucky bluegrass (*Poa pratensis*), rough bluegrass (*P. trivialis*), carrot (*Daucus carota*), and onion (*Allium cepa*). Pre-emergence treatments of mesotrione (Callisto[®]) and isoxaflutole (Balance Pro[®]) at two rates were applied following the first sprinkler irrigation on September 14. Postemergence treatments of topramezone (Impact[®]) at two rates were applied on November 17, 2006; plant growth stages at the time of application are listed in Table 1. Plots were 7 ft by 28 ft with four replications arranged as randomized complete blocks. Treatments were applied with a CO₂ backpack sprayer delivering 20 gal/acre operating at 20 psi and 3 mph. Crop injury and weed control were determined by making visual evaluations on a percentage scale on December 11, 2006 (data not shown) and April 7, 2007.

Results and Discussion

Carrot and onion had no tolerance to any of the herbicide treatments (Table 1). Kentucky bluegrass was moderately to severely injured from all treatments except the low rate of

topramezone. Injury to rough bluegrass was similar to that on Kentucky bluegrass, except that the low rate of isoxaflutole caused little injury.

All three of these herbicides controlled a wide spectrum of common broadleaf weeds. Pre-emergence applications of mesotrione or isoxaflutole controlled 100 percent of common groundsel (*Senecio vulgaris*), henbit (*Lamium amplexicaule*), and flixweed (*Descurainia sophia*), tumble mustard (*Sisymbrium altissimum*), and prickly lettuce (*Lactuca serriola*). Mesotrione also controlled 100 percent of annual polemonium (*Polemonium micranthum*), also called Jacob's ladder, and isoxaflutole controlled 100 percent of blue mustard (*Chorispora tenella*), also called Jim Hill mustard. Topramezone controlled 93 percent or more of common groundsel, henbit, and flixweed; it controlled about 50 percent of blue mustard, tumble mustard, and prickly lettuce; but it did not control annual polemonium.

Given further study and the high levels of weed control from this class of herbicides, it may be possible that lower rates of these herbicides could be used selectively in Kentucky and rough bluegrasses.

Table 1. Crop and weed response to three HPPD-inhibitor herbicides on April 7, 2007 at the Central Oregon Agricultural Research Center near Madras, Oregon.

Treatment	Rate (lb/acre)	Kntky. bluegrass		Rough bluegrass		Carrot	Onion	Common groundsel	Henbit	Flixweed	Blue Tumble		Prickly lettuce	Annual polemonium
		0	33	0	31						0	0		
Check	---	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesotrione ¹	0.188	33	0	100	100	100	100	100	100	100	100	100	100	100
Mesotrione ¹	0.25	23	24	100	100	100	100	100	100	100	100	100	100	100
Isoxaflutole ¹	0.047	25	8	100	100	100	100	100	100	100	100	100	100	88
Isoxaflutole ¹	0.094	48	30	100	100	100	100	100	100	100	100	100	100	100
Topramezone ²	0.0109	5	0	100	100	100	100	100	100	93	55	50	50	0
Topramezone ²	0.0164	43	23	100	100	100	100	100	100	98	50	50	50	0

¹Applied September 14, 2006 pre-emergence to crops and weeds.

²Applied with non-ionic surfactant at 0.25% v/v on November 17, 2006 to 3- to 5-leaf Kentucky bluegrass, 2- to 4-leaf rough bluegrass and carrot, 1- to 2-leaf onion, 4-inch-diameter common groundsel, 1.5-inch-diameter henbit, flixweed, blue mustard, tumble mustard, and annual polemonium, and 1-inch-diameter prickly lettuce.