

EVALUATION OF REFLEX[®] (FOMESAFEN) HERBICIDE FOR YELLOW NUTSEdge CONTROL IN POTATO

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Abstract

A field study was conducted in 2010 at the Malheur Experiment Station, Ontario, Oregon to evaluate Reflex[®] herbicide weed efficacy and compatibility with spray mix partners. The experiment design was a randomized complete block with four replications. Potato variety ‘Ranger Russet’ was planted on 36-inch beds and all herbicide treatments were applied before potato emergence. Reflex was applied alone at rates of 0.25 lb ai/acre or 0.5 lb ai/acre followed by post-emergence application of clethodim (Select[®]) at 0.125 lb ai/acre with crop oil concentrate at 1% V/V. Other treatments were tankmixes of fomesafen at 0.25 lb ai/acre with Dual Magnum[®] (s-metolachlor) at 1.27 lb ai/acre; Sencor[®] (metribuzin) at 0.31 lb ai/acre; Boundary[®] (s-metolachlor + metribuzin) at 1.625 lb ai/acre; and Outlook[®] (dimethenamid-p) at 0.98 lb ai/acre. When applied alone, Reflex controlled yellow nutsedge 86 to 87 percent. Control for common lambsquarters and pigweeds was 100 percent. None of the tested herbicide combinations caused injury to potato. Yellow nutsedge control improved to 98 to 99 percent when Reflex was used as a tankmix partner with Dual Magnum, Outlook, or Boundary. Marketable potato yield ranged from 263 cwt/acre to 455 cwt/acre. The results suggest that Reflex does not cause injury to potato when applied alone or in combination with other products already on the market. Reflex will contribute greatly to yellow nutsedge control when registered for use on potato. The study will be repeated to confirm these results.

Introduction

The overarching goal of this study was to evaluate and develop herbicide combinations to enable growers to manage weeds in potato. Weeds are major production concerns for potato growers since they often reduce potato yield, quality, and may possibly serve as alternative hosts for other crop pests. Once registered, Reflex (fomesafen) will bring a new herbicide group into potato weed control programs. Use of different herbicide families is recommended as a tactic to avoid selection for weed resistance to herbicides. The specific objective of this project was to evaluate Reflex herbicide for yellow nutsedge control when applied alone or as a tankmix partner with standard potato herbicides.

Materials and Methods

The field was plowed and disked during fall 2009 to create a favorable seedbed for potato production. The field was disked again on April 9, 2010 and 36-inch beds were formed. Ranger Russet potato seed pieces were planted on April 23 using a two-row potato planter. The experiment design was a randomized complete block with four replications. Plots were 9 ft (3 rows) wide by 27

ft in length. The fertilizer was broadcast on May 3 to provide 170 lb nitrogen (N)/acre, 150 lb phosphorus (P)/acre, 100 lb potassium (K)/acre, 1 lb zinc (Zn)/acre, 1 lb manganese (Mn)/acre, and 2 lb boron (B)/acre. The beds were immediately rehilled using a Lilleston. Pre-emergence herbicides were applied on May 13 using a compressed CO₂-backpack sprayer with a boom equipped with six Teejet 8002EVS nozzles. Treatments including post-emergence products were applied on June 24. The first furrow irrigation was on June 14 for 24 hours. Visual assessment for potato plant injury and early weed control was made on June 17 and on August 23 to assess late weed control. Visual evaluations were based on a scale of 0 to 100 percent, where 0 = no crop injury or no weed control and 100 = complete crop damage or total weed control. Preventative sprays for late blight were done on June 21 and August 15. The field was irrigated for 24 hours on June 22, July 7, 15, 19, 27, August 3, 14, and 23. Potato vines were flailed on September 7 and the center row harvested on September 13 to determine yield. Potato tubers were graded following USDA standards on September 24-27, 2010. Potatoes were sorted into grades as follows; less than 4 oz, U.S. No.1 (4-6 oz, 6-12 oz, and >12 oz), and U.S. No.2. There were no culls or rotten potatoes. Marketable category was comprised of 4-6 oz to over 12-oz tubers. The data were subjected to analysis of variance using the Statistical Analysis Software (SAS, Institute, Inc., Cary, NC) and means were compared using LSD at $P \leq 0.05$.

Results and Discussion

Visual evaluation indicated no potato injury from any of the herbicide combinations in this study (Table 1). Early weed control was excellent for all treatments. Evaluation for potato row closure on July 6, 2010 indicated no significant difference among plants treated with different herbicide combinations. Late season yellow nutsedge control was 85-to 88 percent for plots treated with Reflex (fomesafen) at 0.25 lb ai/acre and 0.50 lb ai/acre, respectively, followed by post emergence application of Select at 0.125 lb ai/acre. A tank mix of Reflex at 0.25 lb ai/acre plus Sencor (metribuzin) at 0.31 lb ai/acre provided 88 percent yellow nutsedge control. Yellow nutsedge control with Reflex at 0.25 lb ai/acre plus Dual magnum (*s*-metolachlor) at 1.27 lb ai/acre was 99 percent, which was similar to Reflex at 0.25 lb ai/acre plus Outlook (dimethenamid-p) at 0.98 lb ai/acre. Control for common lambsquarters was 88 percent when Reflex was applied at 0.25 lb ai/acre and 0.50 lb ai/acre. Control of lambsquarters with tank mixtures of Reflex at 0.25 lb ai/acre with Dual Magnum at 1.27 lb ai/acre, or Sencor at 0.31 lb ai/acre, or Boundary (*s*-metolachlor + metribuzin) at 1.625 lb ai/acre, or Outlook at 0.98 lb ai/acre ranged from 94 to 100 percent. Pigweed control ranged from 99 to 100 percent for all the treatments evaluated. Even when applied alone at 0.25 lb ai/acre and 0.50 lb ai/acre, Reflex provided 99 to 100 percent pigweed control. Barnyardgrass was controlled 100 percent with all the treatments evaluated. These results suggest improved broadleaf weed control even when Reflex was applied alone. However, a grass herbicide will be needed to provide complete grass control. Tank-mixing Reflex with herbicides already on the market provided superior weed control in potatoes. The study will be repeated to confirm these preliminary results.

Potato tuber yield reflected the level of early season weed control. There was no difference in U.S. No. 2 potato yield among herbicide treatments tested, which ranged from 27 to 62 cwt/acre (Table 2). Small size tuber yield (<4 oz) was similar across treatments and ranged from 80 to 104 cwt/acre. Similarly, there was no significant difference among treatments for the 4- to 6-oz tuber size. The 4- to 6-oz tuber yield ranged from 72 to 105 cwt/acre with the untreated plots producing the lowest yield. The untreated control also produced the lowest 6- to 12-oz tuber yield, which was 120

cwt/acre compared to 176 cwt/acre to 243 cwt/acre for herbicide treatments. The U.S. No.1 potato tuber yield was similar for the different herbicide treatments and ranged from 320 cwt/acre to 414 cwt/acre. The untreated control produced the lowest U.S. No.1 tubers at 236 cwt/acre. These results further confirm that Reflex will provide needed yellow nutsedge control and is not injurious to potato plants or tubers.

Table 1. Late season weed control in potato with Reflex (fomesafen) alone and with tankmix partners at the Malheur Experiment Station, Ontario, OR, 2010.

Treatment	Rate	Crop injury Jun 17	Row closure Jul 6	Control ^a			
				Yellow nutsedge Aug 23	Pigweed species %	Common lambsquarters Aug 23	Barnyard grass
1 Untreated		0 a	94 a	0 c	0 c	0 c	0 b
2 Dimethenamid-p	0.84 lb ai/a	0 a	96 a	95 a	100 a	98 a	100 a
Flumioxazin	0.047 lb ai/a						
Metribuzin	0.31 lb ai/a						
3 Fomesafen	0.25 lb ai/a	0 a	96 a	85 b	99 ab	88 b	100 a
Clethodim	0.125 lb ai/a						
COC	1 % v/v						
4 Fomesafen	0.5 lb ai/a	0 a	98 a	88 b	100 a	89 b	100 a
Clethodim	0.125 lb ai/a						
COC	1 % v/v						
5 Fomesafen	0.25 lb ai/a	0 a	98 a	99 a	99 b	94 ab	100 a
s-metolachlor	1.27 lb ai/a						
6 Fomesafen	0.25 lb ai/a	0 a	99 a	88 b	100 a	99 a	100 a
Metribuzin	0.31 lb ai/a						
7 Fomesafen	0.25 lb ai/a	0 a	99 a	98 a	100 a	96 a	100 a
Boundary	1.625 lb ai/a						
8 Boundary	1.625 lb ai/a	0 a	96 a	100 a	100 a	98 a	100 a
9 Fomesafen	0.25 lb ai/a	0 a	100 a	98 a	100 a	100 a	100 a
Boundary	1.625 lb ai/a						
Sencor 4 FL	0.25 lb ai/a						
10 Fomesafen	0.25 lb ai/a	0 a	98 a	99 a	100 a	99 a	100 a
Dimethenamid-p	0.98 lb ai/a						

^aMeans within a column followed by same letter do not significantly differ ($P = 0.05$, LSD).

Table 2. Potato tuber yield in response to application of Reflex (fomesafen) herbicide alone or with tankmix partners to control weeds at the Malheur Experiment Station, Ontario, OR, 2010

Treatment	Rate	Yield ^a						Total marketable
		U.S. No. 2	U.S. No.1				Total	
		<4 oz	4-6 oz	6-12 oz	>12 oz	cwt/acre		
1 Untreated		27 a	89 a	72 a	120 b	43 a	236 b	263 b
2 Dimethenamid-p	0.84 lb ai/a	45 a	88 a	90 a	252 a	66 a	408 a	453 a
Flumioxazin	0.047 lb ai/a							
Metribuzin	0.31 lb ai/a							
3 Fomesafen	0.25 lb ai/a	34 a	93 a	105 a	238 a	60 a	403 a	437 a
Clethodim	0.125 lb ai/a							
COC	1 % v/v							
4 Fomesafen	0.5 lb ai/a	36 a	80 a	88 a	185 ab	64 a	338 ab	374 a
Clethodim	0.125 lb ai/a							
COC	1 % v/v							
5 Fomesafen	0.25 lb ai/a	41 a	97 a	116 a	233 a	66 a	414 a	455 a
s-metolachlor	1.27 lb ai/a							
6 Fomesafen	0.25 lb ai/a	46 a	99 a	89 a	203 a	51 a	343 a	389 a
Metribuzin	0.31 lb ai/a							
7 Fomesafen	0.25 lb ai/a	40 a	96 a	92 a	244 a	72 a	407 a	447 a
Boundary	1.625 lb ai/a							
8 Boundary	1.625 lb ai/a	54 a	98 a	102 a	232 a	66 a	400 a	454 a
9 Fomesafen	0.25 lb ai/a	45 a	104 a	103 a	196 ab	54 a	353 a	398 a
Boundary	1.625 lb ai/a							
Sencor 4 FL	0.25 lb ai/a							
10 Fomesafen	0.25 lb ai/a	62 a	100 a	88 a	176 ab	56 a	319 ab	381 a
Dimethenamid-p	0.98 lb ai/a							

^aMeans within a column followed by same letter do not significantly differ ($P = 0.05$, LSD).