SAFLUFENACIL IN COOL SEASON GRASSES GROWN FOR SEED

D.W. Curtis, K.C. Roerig, A.G. Hulting and C.A. Mallory-Smith

Introduction

Saflufenacil is a new, low volatile, protoporphyinogen oxidase (PPO) inhibitor herbicide in group 14, a group which also includes the herbicides Goal® and Aim®. Field studies were conducted at Oregon State University from 2008-2011 to evaluate weed control potential and crop response to preemergence and post emergence applications of saflufenacil to perennial ryegrass and tall fescue being grown for seed production. PPO inhibitors including oxyfluorfen (Goal), are used in the grass seed production in combinations with other herbicides because they provide additional herbicide activity. Saflufenacil was tested to see what weed species it controls and to determine if synergy occurred when it was used in combination with other herbicides. Because it is a low volatile herbicide, saflufenacil could be less prone to off target movement than more volatile herbicides. Saflufenacil is not currently registered for use in grasses grown for seed at this time.

Methods

Two studies were conducted at Hyslop Research Farm near Corvallis, OR in the 2008-2009 growing season to evaluate saflufenacil applied either alone or in combination with other herbicides to quantify any synergistic effects for control of grass weeds in perennial ryegrass. The following two years, saflufenacil also was evaluated in two studies for broadleaf weed control with other low volatile herbicides in new plantings of perennial ryegrass. Saflufenacil was evaluated in the spring of 2011 for summer annual broadleaf weed control and crop tolerance in a commercial field of spring-planted tall fescue near Lebanon, Oregon. In all, five randomized complete block design studies, with four replications each, were conducted over four years. All studies were evaluated visually for percent weed control. Studies located at Hyslop Research Farm were harvested and evaluated for clean seed yield**.**

Results and Discussion

Study 1.

Saflufenacil applied to a new seeding of perennial ryegrass and was evaluated for control of diuron resistant annual bluegrass, Italian ryegrass and California brome. Saflufenacil was applied at 0.022 lb ai/A alone and in combination with either metribuzin (not currently registered for use on seedling perennial ryegrass), mesotrione (Callisto®), which previous research has shown to have activity on some grass species, and ethofumesate (Nortron®) to the ryegrass at the 1 tiller stage of growth (Table 1). Saflufenacil applications provided negligible control of the grass weed species in this study when applied alone. Mesotrione had limited activity on California brome but this activity was reduced by the combination with saflufenacil. In combination with metribuzin, saflufenacil applications resulted in a small additive effect for control of annual bluegrass and Italian ryegrass. In combination with ethofumesate, saflufenacil reduced control of California brome. Saflufenacil did not injure perennial ryegrass and had no effect on seed yield.

Table 1. Post emergence herbicide combinations for control of grass weed species in fall seeded perennial ryegrass grown for seed, Hyslop, 2008-2009.

Treatment[2]	Rate	Annual bluegrass[1]	California brome	Italian ryegrass	Seed yield[1]
	(lb ai/A)	----------(% Control[3])----------			(lb/A)
check		0	0	0	1847
metribuzin	0.14	18	10	30	1989
mesotrione	0.19	0	25	5	2091
ethofumesate	1.00	8	60	5	1955
saflufenacil	0.022	0	5	5	1984
saflufenacil +	0.022	25	23	48	2031
metribuzin	0.14				
saflufenacil +	0.022	0	3	10	2045
mesotrione	0.094				
saflufenacil +	0.022	15	43	8	1915
ethofumesate	1.00				
LSD (P = 0.05)					NS
CV					8.67

[1]Diuron resistant annual bluegrass, California brome, Italian ryegrass, perennial ryegrass seeded 9/24/2008

[2]Applied 11/18/2008 to 3 leaf - 2 tiller perennial ryegrass; NIS at 0.25% v/v + AMS at 8.5 lb/100gal added to mesotrione treatments; COC at 1 % v/v + AMS at 8.5 lb/100gal added to saflufenacil treatments

[3]Visual ratings 3/3/2009

Study 2.

Pyroxasulfone (Zidua®), glufosinate (Rely®), oxyfluorfen and saflufenacil were applied alone and in combination to an established stand of perennial ryegrass. The addition of these herbicides to pyroxasulfone contributed to a small increase in the control of diuron resistant annual bluegrass compared to when applied alone (Table 2). There were no differences in seed yields. Pyroxasulfone is not currently registered for use in grasses grown for seed.

Table 2. Annual bluegrass control in established perennial ryegrass grown for seed, Hyslop, 2009.

Treatment[3]	Rate	Annual bluegrass[1]	Crop injury[4]	Seed yield[2]
	(lb ai/A)	(% Control[4])	(%)	(lb/A)
check		0	0	1569
pyroxasulfone	0.09	90	3	1207
glufosinate	0.38	71	15	1144
oxyfluorfen	0.25	23	0	1403
saflufenacil	0.022	20	0	1500
pyroxasulfone +	0.09	98	15	1033
glufosinate	0.38			
pyroxasulfone +	0.09	98	8	1139
oxyfluorfen	0.25			
pyroxasulfone +	0.09	98	3	1273
saflufenacil	0.022			
LSD (P = 0.05)				NS
CV				19

[1]Diuron resistant annual bluegrass planted 10/15/2008

[2]Perennial ryegrass planted 9/25/2007

[3]Treatments applied 1/13/2009; NIS added to saflufenacil treatments at 0.25% v/v

[4]Visual ratings 4/24/2009

Studies 3 and 4.

Two studies initiated to evaluate broadleaf control with saflufenacil in newly seeded plantings of perennial ryegrass were conducted during the 2009-2010 and 2010-2011 growing seasons. In 2009, saflufenacil was applied at 0.022 lb ai/A to 1 tiller perennial ryegrass. In 2010, saflufenacil was applied at 0.089 lb ai/A preemergence and at 0.022 lb ai/A post emergence to 1 tiller perennial ryegrass. The post emergence applications provided 95-100% control of ivy-leaf speedwell, lesser-seeded bittercress and both common and sticky chickweed (Table 3). The post emergence weed control of saflufenacil was comparable to that from carfentrazone (Aim) and pyraflufen (Edict™). Saflufenacil did not provide effective control of the weed species when applied preemergence (Table 4). Yields were not affected by either pre or post emergence applications of saflufenacil.

Table 3. Broadleaf weed control in fall seeded perennial ryegrass grown for seed, Hyslop, 2009-2010.

Treatment[2]	Rate	Ivy-leaf speedwell	Lesser-seeded bittercress	Common chickweed	Sticky chickweed	Seed yield[1]
	(lb ai/A)	----------(% Control[3])----------				(lb/A)
check		0	0	0	0	1507
pyraflufen	0.0016	85	100	100	100	1629
carfentrazon	0.023	100	100	75	100	1717
saflufenacil	0.022	95	100	100	100	1711
LSD (P = 0.05)						NS
CV						11

[1]Perennial ryegrass planted 10/5/2009

[2]Applied 11/23/2009 to 1 tiller perennial ryegrass, NIS added at 0.25% v/v

[3]Visual ratings 1/26/2010

Table 4. Pre and post emergence broadleaf weed control in fall seeded perennial ryegrass grown for seed, Hyslop, 2010-2011.

Treatment	Rate	Appl.[2]	Lesser-seeded bittercress	Shepherd's purse	Sticky chickweed	Mayweed chamomile	Seed yield[1]
	(lb ai/A)	(timing)	---------- (% Control[3])----------				(lb/A)
check			0	0	0	0	1198
saflufenacil	0.089	Pre	45	78	35	93	1320
saflufenacil	0.022	Post	100	100	100	100	1308
pyraflufen	0.0016	Post	88	78	78	95	1345
carfentrazone	0.023	Post	100	100	100	100	1220
LSD (P = 0.05)							NS
CV							8

[1]Perennial ryegrass planted 9/30/2010

[2]Pre applied on 10/2/2010; Post applied on 11/10/2010 to 1 tiller perennial ryegrass; NIS at .25 % v/v added to all post timing treatments

[3]Visual ratings 3/28/2011

Study 5.

A study conducted in the spring of 2011 included applications of saflufenacil at 0.022 lb ai/A alone and in combination with mesotrione to 2 leaf spring-planted tall fescue. Saflufenacil provided 90% control of the initial germination flush of sharppoint fluvellin, but did not control later emerging sharppoint fluvellin. The combination of mesotrione and saflufenacil provided 80% control of the later emerging sharppoint fluvellin. Neither saflufenacil nor mesotrione provided effective control of erect knotweed.

Table 5. Broadleaf weed control in spring-planted tall fescue grown for seed, Lebanon, OR, 2011.

		Percent Weed Control						
		Sharppoint fluvellin				Erect knotweed		
Treatment[1]	Rate	5/16	5/27	6/14	7/22	5/27	6/14	7/22
	(lb ai/A)	---------- (%) ----------						
check		0	0	0	0	0	0	0
mesotrione	0.094	0	88	83	80	56	28	43
saflufenacil	0.022	90	73	70	63	48	8	35
mesotrione +	0.094							
saflufenacil	0.022	90	93	85	80	58	28	40

[1]Applied 5/13/2011 to 1 to 2 leaf tall fescue and 4 leaf sharppoint fluvellin

Summary

Results of these studies suggest that saflufenacil will provide effective control of several broadleaf species. Future work will include evaluating tolerance in other grass seed crops including fine fescues and orchardgrass and optimizing uses in tall fescue.