Volunteer Wheat Control in Newly Seeded Kentucky Bluegrass Grown for Seed

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Abstract

Wheat seeds lost before or during harvest can become the source of volunteer plants in the following crop. Volunteer wheat plants compete for resources with the crop similarly to other weeds. In spring of 2012, a field study was initiated in central Oregon to evaluate volunteer wheat control with herbicides with grass activity in newly established Kentucky bluegrass. Treatments included ethofumasate, mesotrione, and primisulfuron applied at different timings and rates. High levels of volunteer wheat control were recorded with ethofumasate and primisulfuron but were associated with high levels of crop injury resulting in significant reduction of grass seed yield. The marginal volunteer wheat control with mesotrione, combined with a low level of crop injury resulted in the highest crop yield among the tested treatments.

Introduction

Crop rotation in central Oregon often involves planting perennial grass for seed in August following wheat harvest. Wheat grain losses occur before and during harvest. As a result, wheat seeds remain in the soil and become the source of volunteer plants in the next crop. Volunteer wheat plants then compete with the perennial grass crop for light, nutrients and water, similar to other weeds, affecting yields, quality and even compromising new stands. Control of annual grasses growing in competition with perennial grasses is difficult due to morphological and physiological similarities, drastically limiting herbicide control options. Management options are further restricted due to the limited alternatives available for grass control in perennial grass seedlings. These management complexities and the resulting crop losses make the control efficacy of volunteer wheat and potential crop injury of currently labeled options a high priority.

Materials and Methods

A field study was conducted in September, 2012 on a newly planted Kentucky bluegrass field at the Central Oregon Agricultural Research Center located in Madras, Oregon. The study design was a randomized complete block with four replications, with a plot size of 10 ft by 30 ft. The treatments consisted of ethofumasate (Nortron®), mesotrione (Callisto®), and primisulfuron (Beacon®). Ethofumasate and mesotrione were applied pre-emergence and early post, while primisulfuron was applied early post and in two post emergence sequential applications. Herbicides were applied with a backpack sprayer calibrated to deliver 20 gallons of spray solution per acre at 40 psi pressure using XR 8002 Teejet® nozzles. Application dates and environmental conditions for each study are detailed in Table 1.Herbicide rates and adjuvants are detailed in Table 2. Herbicide efficacy and crop injury were evaluated in spring of 2013.Plots were harvested in 2013 to determine the impacts of each treatment on grass seed yield.

Results and Discussion

Volunteer wheat control and crop injury differed between treatments and time of application (Table 2). For instance, control with ethofumasate applied at pre-emergence was excellent (98 percent) but crop injury was significant (38 percent). Kentucky bluegrass injury was reduced to 18 percent when ethofumasate was applied early post emergence, but only 10 percent of volunteer wheat was controlled. The application of mesotrione at pre-emergence resulted in only 5 percent control of volunteer wheat with a crop injury of 3 percent. Control with mesotrione improved to 68 and 59 when applied early post at rates of 3 and 6 fl oz/acre, and no crop injury was observed for this treatment in spring. Primisulfuron applied at 0.76 oz/acre, or in sequential applications of 0.38 oz/acre each, provided 97 and 92 percent volunteer wheat control respectively. Nevertheless, a high level of crop injury was observed with this treatment in spring. Ethofumasate and primisulfuron treatments provided high levels of volunteer wheat control but were associated with elevated crop injury that resulted in lower seed yield (Table 2). Mesotrione at 3 or 6 oz/acre provided partial volunteer wheat control (68 and 59 percent) but combined with a low crop injury resulted in seed yields of 167 and 155 lb/acre, the highest among all treatments. Results from this study indicate that volunteer wheat control in newly established stands of Kentucky bluegrass with labeled herbicide is difficult because the most effective treatments cause unacceptable levels of crop injury ,while control with the safest products are not commercially acceptable. The levels of control and crop injury observed with the use herbicides emphasizes the need to implement an integral control program that includes cultural practices that ensure vigorous stands of Kentucky bluegrass, and reduction of wheat seed losses during harvest. The current study will be repeated in 2014, to confirm initial findings and explore other potential options.

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Table 1.Application date and environmental conditions for the herbicide applications.

Application timing	A	B	C
Application Date	9/28	11/2	11/22
Time of Day	9 AM	10 AM	11:00 AM
Air temperature (F)	68	42	44
Relative Humidity (%)	31	80	56
Wind Speed (MPH)	2	2	5
Wind Direction	SSE	NW	NE

Table 2. Percent volunteer wheat control, crop injury and Kentucky bluegrass seed yield.

No.	Name[1]	Rate	Unit	Code[2]	Control[3] Percent		Injury Percent		Yield lb/acre	
1	Nortron	3	pt/acre	A	98	a	38	b	91	bc
2	Nortron	3	pt/acre	B	10	c	18	c	34	c
3	Callisto	6	fl oz/acre	A	5	c	3	c	86	bc
4	Callisto	3	fl oz/acre	B	68	b	0	c	167	a
	COC	1	% v/v	B						
	Ammonium Sulfate	8.5	lb/100 gal	B						
5	Callisto	6	fl oz/acre	B	59	b	0	c	155	ab
	COC	1	% v/v	B						
	Ammonium Sulfate	8.5	lb/100 gal	B						
6	Beacon	0.38	oz wt/acre	B	97	a	60	a	42	c
	COC	1	% v/v	B						
	Beacon	0.38	oz. wt/acre	C						
	COC	1	% v/v	C						
7	Beacon	0.76	oz. wt/acre	B	92	a	40	b	88	bc
	COC	1	% v/v	B						
8	Untreated Check				0	c	0	c	67	c
	LSD (P=.05)				15		16		55	

[1]Before using an herbicide, make certain is it properly labeled for the intended use.
[2]Abbreviations: Crop Oil Concentrate, COC; A= pre-emergence; B= early Post emergence; C=20 days after B
[3]Means among columns followed by the same letter are not different at P=0.05.