

EVALUATION OF GOAL[®] 2XL SOIL CARRYOVER INJURY IN WINTER WHEAT PLANTED AFTER DRY BULB ONIONS

Joel Felix and Joey Ishida
Malheur Experiment Station
Oregon State University
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Introduction

The herbicide oxyfluorfen (Goal[®] 2XL) is registered for use on onion, but only after onion seedlings have reached the 2-leaf stage. Even though Goal is primarily applied post-emergence on onions, it has pre-emergence soil residual activity for weed control in other labeled crops. Currently the label recommends a minimum of 10-month interval before wheat is planted following use at 0.25 to 0.50 lb ai/acre (1 to 2 pt/acre) of Goal 2XL on onions. Growers have indicated a desire to plant wheat in the fall after harvesting onions. The objective of this study was to evaluate the response of winter wheat planted after onions treated with Goal 2XL in the Treasure Valley of southwestern Idaho and eastern Oregon.

Materials and Methods

A field study was conducted in 2009 at the Malheur Experiment Station, Ontario, Oregon in collaboration with Dow AgroScience to evaluate the potential for Goal soil carryover to injure winter wheat planted after onion harvest. The same set of treatments was being evaluated at Prosser in Washington State. The grain stubble was flailed after wheat harvest, and the field was irrigated, disked, plowed, and bedded during fall 2008. The field was harrowed and planted to onion variety 'Vaquero' on March 25, 2009. The study followed a randomized complete block design with four replications and plot size was 8 rows on 22-inch by 60-ft beds. Chlorpyrifos (Lorsban[®] 15G) insecticide was banded at 0.125 lb ai/acre (3.7 oz/1,000 ft of row) on March 31. The treatment that included pendimethalin at 1 lb ai/acre (Prowl[®] H₂O, 2.1 pt/acre) was applied on April 22. Similarly, Sethoxydim at 0.28 lb ai/acre (Poast[®], 1.5 pt/acre) was applied on April 22 to control volunteer wheat. On May 12, onions were sprayed with bromoxynil at 0.25 lb ai/acre (Buctril[®], 16 oz/acre) in 48 gal of spray solution. The first postemergence Goal 2XL was applied when onions were at the 2-leaf stage on May 22. Onions were fertilized with a compound fertilizer on June 10 to supply 175 and 2 lb/acre nitrogen and sulfur, respectively. Spraying for aphid control commenced on June 11 with the application of spinosad at 0.125 lb ai/acre + Azadirachtin 0.0123 lb ai/acre (Success[®], 8 oz/acre + Aza-Direct[®], 16 oz/acre + Ad-wet, 1 qt/acre). Treatments requiring a second Goal 2XL application were applied when onions were at the 4-leaf stage on June 18. Onions were sprayed again for thrips control on June 19. Methomyl 0.9 lb ai/acre (Lannate[®], 3 pt/acre) was applied for thrips control on July 10 and August 4. Furrow irrigation was scheduled to maintain enough moisture in the top 12 inches of the soil

profile. Onions were lifted on September 11 and 20 ft of the 2 center rows were harvested from each plot on September 15. Dry bulb onions were graded following USDA standards on September 17 and the data were subjected to analysis of variance.

The field was disked immediately after onion harvest in September 2009 and planted to wheat var 'Stephens' at 100 lb/acre on November 2009. Wheat will be evaluated in 2010 for visual injury, grain filling, and final yield in plots treated with Goal 2XL the previous year.

Results and Discussion

Note: Goal is registered for use on direct-seeded dry bulb onions only after seedlings have reached the 2-leaf stage. Multiple applications at 0.50 to 1 oz ai/acre (2 to 4 fl oz/acre) may be applied up to a maximum of 10 oz ai/acre (2.5 pts/acre) per use season.

No weed control assessments were done on this study since it was established for soil residual carryover purposes.

Visual evaluations on May 29, 2009 indicated onion injury ranging from 5 to 14 percent (Table 1). Onion injury symptoms were mainly characterized by leaf tip burn, occasional necrotic spots on leaves, and droopy and curled leaves. Evaluations on June 26 indicated no injury on onions treated with Goal 2XL at the 2-leaf stage regardless of the use rate. However, injury was observed on onions treated with Goal at 16 oz/acre at the 4-leaf stage. The injury ranged from 21 to 23 percent and was only 5-6 percent on July 3, 2009. Injury symptoms were temporary and did not affect the final marketable yield.

Goal treatments did not reduce total marketable dry bulb onion yield, which ranged from 991 to 1,059 cwt/acre (Table 2). Winter wheat will be visually evaluated for injury, grain filling, and final grain yield in 2010. The results of wheat performance will be used to advise growers on wheat plant back in the year after harvesting onions.

Table 1. Onion injury in response to application of different rates of Goal 2XL at the Malheur Experiment Station, Ontario, OR, 2009.

Treatment	Rate	Onion stage	Timing [†]	Onion injury [‡]		
				5/29/2009	6/26/2009	7/3/2009
Untreated				% 0.00 d	% 0.0 b	% 0.00 c
GOAL 2XL	8 fl oz/a	2-Leaf	B	4.38 c	0.0 b	0.00 c
GOAL 2XL	16 fl oz/a	2-Leaf	B	10.63 b	0.0 b	0.00 c
GOAL 2XL	32 fl oz/a	2-Leaf	B	14.38 a	0.0 b	0.00 c
GOAL 2XL	16 fl oz/a	2-Leaf	B	11.25 b	21.3 a	5.00 b
GOAL 2XL	16 fl oz/a	4-Leaf	C			
Prowl H ₂ O	2.1 pt/a	Loop	A	10.00 b	22.5 a	6.25 a
GOAL 2XL	16 fl oz/a	2-Leaf	B			
GOAL 2XL	16 fl oz/a	4-Leaf	C			
Prowl H ₂ O	2.1 pt/a	Loop	A	5.00 c	22.5 a	5.00 b
GOAL 2XL	8 fl oz/a	2-Leaf	B			
GOAL 2XL	16 fl oz/a	4-Leaf	C			

[†]A = Prowl applied pre-emergence (April 22, 2009); B = Goal 2XL applied postemergence when onions were at the 2-leaf stage (May 22, 2009); C = Goal 2XL applied postemergence when onions were at the 4-leaf stage (June 18, 2009).

[‡]Means followed by same letter do not significantly differ (P = 0.05, LSD).

Table 2. Marketable onion yield in response to application of Goal 2XL at different rates at the Malheur Experiment Station, Ontario, OR, 2009.

Treatment	Rate	Onion stage	Timing [†]	Onion yield [‡]					
				Small	Medium	Jumbo	Colossal	Super colossal	Marketable
Untreated				7 a	46 a	767 a	190 abc	12 a	1015 a
GOAL 2XL	8 fl oz/a	2-Leaf	B	7 a	43 ab	833 a	168 bc	17 a	1060 a
GOAL 2XL	16 fl oz/a	2-Leaf	B	8 a	44 a	777 a	165 bc	5 a	991 a
GOAL 2XL	32 fl oz/a	2-Leaf	B	6 a	44 a	781 a	166 bc	8 a	999 a
GOAL 2XL	16 fl oz/a	2-Leaf	B	7 a	46 a	811 a	153 c	9 a	1018 a
GOAL 2XL	16 fl oz/a	4-Leaf	C						
Prowl H2O	2.1 pt/a	Loop	A	6 a	44 a	803 a	197 ab	9 a	1053 a
GOAL 2XL	16 fl oz/a	2-Leaf	B						
GOAL 2XL	16 fl oz/a	4-Leaf	C						
Prowl H2O	2.1 pt/a	Loop	A	4 a	30 b	777 a	223 a	10 a	1039 a
GOAL 2XL	8 fl oz/a	2-Leaf	B						
GOAL 2XL	16 fl oz/a	4-Leaf	C						

[†]A = Prowl applied pre-emergence (April 22, 2009); B = Goal 2XL applied postemergence when onions were at the 2-leaf stage (May 22, 2009); C = Goal 2XL applied postemergence when onions were at the 4-leaf stage (June 18, 2009).

[‡]Means followed by same letter do not significantly differ (P = 0.05, LSD)