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RYEGRASS CONTROL IN WINTER WHEAT WITH HERBICIDES

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SUMMARY

This study was conducted to determine the efficacy of herbicides in the control of annual ryegrass (Lolium multiflorum Lam.) in winter wheat (Triticium aestivum L.). Hoelon (methyl ester of diclofop), Glean (chlorsulfuron), prodiamine, and Tycor (BaySmy 1500) were tested. The study was conducted during a 3 year period at Overton, Texas. Results indicated Hoelon and Glean applied either preemergence or postemergence (2-3 leave stage) controlled or eliminated ryegrass completely and significantly increased grain yields. Glean caused some phytotoxicity in 1 year out of 3, which was associated with high rainfall. Prodiamine, applied preemergence and incorporated, was also effective in reducing ryegrass and improving grain yields. Tycor eliminated ryegrass and cheat (Bromus secalinus L.) and increased yields compared to the untreated control. Tycor caused significant phytotoxicity on the wheat at the rates applied in this study. Spring-applied Hoelon controlled ryegrass, but was somewhat phytotoxic to the wheat and did not increase grain yields. Spring-applied Glean was not effective in controlling ryegrass.

OBJECTIVE

The objective of this experiment was to determine the efficacy of several herbicides in controlling annual ryegrass and other weeds in winter wheat and to determine the effect ryegrass control would have on wheat grain yields.

PROCEDURE

Field experiments were conducted at the Texas A&M University Agricultural Research and Extension Center, Overton in fall 1982, 1983, and 1984. McNair 1003 wheat was planted each year at a seeding rate of 90 lb/A. Gulf ryegrass was broadcast in the entire test at a rate of 27 lb/A. In 1982, wheat plots were 9 X 50 ft and row spacing was 8 inches. In 1983 and 1984, plots were 4 by 50 ft. In years 1 and 3, the test was arranged as a randomized complete block with three

replications and it was planted on a Darco loamy fine sand with a pH of 6.2. In year 2, the soil type was a Sacal fine sandy loam with a pH of 6.5.

Treatments evaluated in 1982-83 were Hoelon applied at two different postemergence dates, and Glean applied at several different rates and times (Table 1). The preemergence treatments were applied the day after wheat was planted. The postemergence treatments were applied 19 days after planting, when the wheat was in the two to three leaf stage. The spring treatments were applied on 8 March when the wheat was in the early jointing stage (34 of Zadots et al. growth stages). Data were collected on percent control of ryegrass on 1 January and 3 March and broadleaf control on 3 March. Data on phytotoxicity on wheat, heading date, plant height, lodging, yields and test weight were also collected. In 1983-84, in addition to Hoelon and Glean, Tycor (two rates) and Prodiamine (three rates) were applied preemergence (Table 2). Two treatments of Prodiamine were incorporated by dragging a 2-inch chain over the plots after the chemical was applied (surface blend). In 1984-85, the same herbicides were applied as in 1983-84 (Table 3). All chemicals for all years were applied at a rate of 20 gal/A of water utilizing a CO_2 backpack sprayer. In 1984-85, in addition to overseeding the test with ryegrass, cheat (Bromus secalinus) seed was broadcast over a small area of each plot at a seeding rate of 4 lb/A. Visual estimates were taken for percentage ryegrass and cheat control with 0 equal to no control and 100 equal to complete kill. Wheat phytotoxicity was taken on a scale of 0 to 9 where 0 equaled no injury and 9 equaled severe injury. Fertilization in 1982-83 was 60 lb/A each of N, P_2O_5, and K_2O. Wheat was top dressed with 70 lb N/A on 2 February, 1983. During the second and third year of the study, the preplant fertilization rate was 24 lb N/A and 96 lb/A for both P_2O_5 and K_2O. In 1983-84, N was topdressed at a rate of 60 lb/A on 1 November, plus 40 lb/A on 26 February. In 1984-85, N was topdressed at a rate of 70 lb/A on 7 November, plus 65 lb/N/A on 18 February. Wheat was harvested with a Hege plot combine cutting a 4 X 50 ft plot.

RESULTS

In 1982-83, wheat stands were uniform, but not good and probably

limited yields somewhat. Ryegrass stands were dense and limited yields wherever the ryegrass was not controlled by herbicidal treatments (Table 1). The highest grain yield was 44 bu/A on wheat plots treated with Glean in a split treatment of 1/3 oz ai/A as preemergence plus 1/3 oz ai/A postemergence. The Glean treatment of 1/2 oz/A produced a yield which was statistically equal (0.05 level) to the split treatment. The lowest yields were produced on wheat in the untreated control and in the spring-applied herbicide treatments. Excellent ryegrass control was obtained from the Hoelon postemergence treatment. Glean treated wheat resulted in slightly less ryegrass control, although the split preemergence and postemergence treatment was nearly equal to the Hoelon treatment. The highest yields were produced on those plots where ryegrass was controlled by herbicides. The percentage increase in yield from the split Glean treatment over the control was 352 percent. Broadleaf control was best on wheat treated with Glean, and Hoelon did not control broadleaf weeds. Some phytotoxicity was noted on wheat when either Hoelon or Glean was applied in the spring. All of the symptoms disappeared before harvest.

In 1983-84, good stands of both wheat and ryegrass were obtained. An unusually cold December resulted in severe winterkill of the ryegrass. Good grain yields were obtained in all treatments; however, the lowest yields were obtained in the control plots where no herbicide had been applied (Table 2). This indicates there was sufficient ryegrass remaining to reduce wheat yields. A reduced yield was also obtained from the Tycor (1.78 lb/A) treated wheat. This was caused by a phytotoxicity reaction which actually reduced stands by nearly 50 percent. The remaining wheat plants grew out of the condition, tillered-out more than the other treatments, and seemed to compensate for the loss in stand. There was little difference among the other treatments for grain yield. A dry May probably limited wheat grain yields in all treatments, but more so in plots with good wheat stands. Very good ryegrass control resulted from most of the herbicide treatments. The best treatments were Hoelon, Glean (0.38 oz/A or 0.75 oz/A), Tycor (0.89 lb/A), and the Prodiamine treatments that were incorporated. Differences in plant height or maturity were not observed. Broadleaf weeds were not present in this experiment.

In 1984-85, good wheat stands and ryegrass stands were obtained. Cheat stands were uniform but quite low and probably did not affect grain yields. Very good ryegrass control was obtained by all herbicide treatments. The two treatments with less ryegrass control were prodiamine treatments that were incorporated (1/8 lb/A and 1/4 lb/A). Cheat control by Tycor and Hoelon was superior to the other treatments. Glean also controlled 63 percent of the cheat while Prodiamine had no affect on cheat. The best broadleaf control appeared to be by Glean, Tycor, and Prodiamine (1/8 lb/A incorporated). Phytotoxicity on wheat was observed for both Tycor treatments and for Glean. Rainfall in the test site was 9 and 5 inches for November and December, respectively. Since the soil was very sandy, excessive leaching of Glean into the wheat root zone may have occurred in 1984-85. Grain yields were fairly good, and as in other years, the control plots produced the lowest grain yields. Hoelon, Prodiamine, and Tycor treated wheat all produced high yields. The persistance of Glean may have resulted in lower yields in 1984-85.

Evidently the wheat recovered from the Tycor phytotoxicity as wheat with these treatments produced high yields. Since Tycor apparently controls both ryegrass and cheat, it has excellent potential if the phytotoxicity problem can be overcome. Glean controlled ryegrass as well as broadleaf weeds in this study. Hoelon controlled annual ryegrass very well in each of the 3 years.

TABLE 1. EFFECT OF CHEMICAL TREATMENTS ON GRAIN YIELD, PERCENT RYEGRASS, PERCENT BROADLEAF CONTROL, AND WHEAT PHYTOTOXICITY, 1982-83

Herbicide	Rate ai/A	Yield bu/A	Percent ryegrass Control Jan. 14	Percent ryegrass Control Mar. 3	Broadleaf control % Mar. 3	Phytotoxicity on wheat Mar. 25+
Hoelon	1 lb postemergence	33bc*	100c*	100c*	0c*	0a*
Hoelon	1.25 lb spring-applied +	13d	0a	0a	0c	2c
Glean	1/3 oz preemergence	28c	67b	50b	93ab	0a
Glean	1/2 oz preemergence	39ab	90c	73cd	100a	0a
Glean	1/3 oz postemergence	27c	53b	57bc	100a	0a
Glean	1/3 oz postemergence	31bc	63b	57bc	67b	
Glean	1/3 oz preemergence + 1/3 oz postemergence	44a	95c	82de	100a	0a
Glean	1/2 oz spring-applied +	10d	0a	0a	0c	1b
Glean	2/3 oz spring-applied + 5d	0a	0a	0c	2c	
Control		10d	0a	0a	0c	0a
Mean		20	47	42	46	2

+Treatments applied on Mar. 8, to fully tillered wheat.

++Phytotoxicity rated on a scale of 0 to 9, where 0 equals no phytotoxicity.

*Means followed by the same letter are not significantly different, at the 0.05 level, Duncans New Multiple Range Test.

TABLE 2. EFFECT OF CHEMICAL TREATMENTS ON GRAIN YIELD, PERCENT RYEGRASS CONTROL, AND WHEAT PHYTOTOXICITY, IN 1983-84

Herbicide	Rate ai/acre	Yield	Percent ryegrass Control		Wheat Phytotoxicity rating
		bu/A	Mar. 11	May 25	Nov. 16++
Hoelon	1 lb	62ab*	98d*	100d*	0a*
Glean	0.38 oz	66	90cd	98d	0a
Glean	0.75 oz	65	95d	100d	1a
Tycor	0.89 lb	67b	95d	96cd	1a
Tycor	1.78 lb	52a	100d	99d	5c
Prodiamine	1/4 lb	62ab	60b	80b	0c
Prodiamine	1/2 lb	62ab	82c	88bc	0c
Prodiamine	1 lb	64b	82c	92cd	0c
Prodiamine	1/2 lb incorp+	67b	98d	95cd	2n
Prodiamine	1 lb incorp+	62ab	98d	100cd	2b
Control		52	0a	0a	0a
Mean		62	82	86	

+Treatments incorporated (surfaceblend) by dragging a chain over plots.

++Phytotoxicity noted on a scale of 0 to 9, where 0 equals no phytotoxicity.

*Means followed by the same letter are not significantly different at the 0.05 level, Duncans New Multiple Range Test.

TABLE 3. EFFECT OF CHEMICAL TREATMENTS ON GRAIN YIELD, PERCENT RYEGRASS, CHEAT AND BROADLEAF CONTROL AND WHEAT PHYTOTOXICITY, IN 1984-85

Herbicide	Rate ai/A	grain yield bu/A	Percent Control Ryegrass Dec. 6	Ryegrass Apr. 21	Cheat Apr. 29	Broadleaf Apr. 29	Phytotoxicity§ on wheat Dec. 6
Hoelon	1 lb	55a*	100a*	100a*	90a*	30bc*	0a*
Prodiamine	1 lb‡	51ab	98a	73cd	0c	20c	0a
Prodiamine	1/2 lb‡	49abc	92ab	76bcd	0c	37bc	0a
Tycor	1/4 lb	49abc	100a	93ab	100a	77ab	4b
Tycor#	1 lb	47abc	100a	100a	100a	80ab	5b
Prodiamine	1/4lb‡	46bc	83bc	67de	7c	23c	0a
Glean	1/3 oz	44bc	97ab	90abc	63b	100a	4b
Prodiamine	1/8 lb‡	42c	74c	53e	0c	50abc	0a
Control		29d	0d	0f	0c	0c	0a
Mean		46	83	72	40	46	1

+Treatment applied 2 days after planting.

‡Treatment incorporated (surface blend) by dragging chain over plot.

#Treatment applied postemergence at two-leaf stage.

§Phytotoxicity rated on a scale of 0 to 9, where 0 equals no phytoxicity.

*Means followed by the same letter are not significantly different at the 0.05 level, Duncans New Multiple Range Test.