CURATIVE CONTROL OF WHITE CLOVER IN A KENTUCKY BLUEGRASS LAWN, 2008

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J.E. Kaminski and J. Machnicki

Department of Plant Science
University of Connecticut, Storrs, CT

INTRODUCTION

White clover (*Trifolium repens*) is a common broadleaf weed of home lawns and golf and athletic field turf due to its ability to tolerate close mowing, fix atmospheric nitrogen, and survive a range of soil conditions. On athletic field or in high quality lawns, its presence is discouraged because it disrupts stand uniformity and may present safety issues for athletes. The objective of this study was to evaluate the efficacy of several herbicides for white clover when applied at varying rates and/or with sequential applications.

MATERIALS & METHODS

This study was initiated at the University of Connecticut Plant Science Research Facility located in Storrs, CT. Prior to initiation of the treatment the study area was established to 'Langara' Kentucky bluegrass (*Poa pratensis* L.) in October 2006. In 2008, a natural infestation of white clover was observed in the study area. All treatments are listed in the data tables. Briefly, treatments included Confront (triclopyr + clopyralid), Drive (quinclorac), Tenacity (mesotrione), Q4 (quinclorac + sulfentrazone + 2,4-D + dicamba), Surge (AI), Speedzone (dicamba + 2,4-D + carfentrazone + MCPP), Lontrel (clopyralid), and Trimec Classic (2,4-D + MCPA + dicamba). Treatments were applied at various rates and applied either as a single or sequential application. Initial application of all treatments occurred on 26 Jun and all plots receiving sequential treatments were applied on 15 Jul.

Plots measured 3 ft x 6 ft and were arranged in a randomized complete block with 3 replications. All treatments were applied with a CO_2 pressurized (40 psi) backpack sprayer equipped with a flat-fan nozzle and calibrated to deliver 1.0 gal water per 1000 ft^2. Plots were rated for injury to the clover, percent clover, percent crabgrass, and overall turfgrass quality. Any discoloration to the desirable Kentucky bluegrass species was also noted. Descriptions of all evaluations are outlined in the footnotes of each data table.

RESULTS DISCUSSION

Clover. Clover injury was noted within a few days of the initial applications on 26 Jun. On 30 Jun, the greatest level of injury to the clover species was exhibited in plots treated with Q4, Speedzone and Lontrel (Table 1). Equal levels of injury, however, were observed within the aforementioned treated plots and plots treated with Surge and Trimec Classic. By 3 Jul (1 week after initial treatment; WAIT), the high rate of Speedzone (1.8 fl oz per 1000 ft^2) provided the greatest level of injury to the clover (4.0) and was statistically similar to Speedzone applied at 1.1 fl oz. Desirable injury levels (≥3.0) were observed within plots treated with Q4 and Lontrel when plots were rated 1 WAIT. On the final injury rating date (20 Jul), only plots treated with Tenacity or Surge (sequential applications only) exhibitied injury to the surviving clover.

When plots were first rated for clover control on 20 Jul, all treatments except Tenacity resulted in excellent suppression of white clover. On 20 Jul, percent plot area covered with clover was 63 to 79% in plots treated with Tenacity. All other treated plots had little to no clover on 20 Jul (~ 3.5 WAIT). Percent clover remained low within most treatments when rated on 1 Aug, while those plots treated with sequential applications of Tenacity began to exhibit moderate levels of clover control (18 to 29%) when compared to the untreated control plots (62%). On the final rating date (15 Aug), all plots except those treated with Tenacity resulted in complete or near complete (<1.0%) control of white clover. Moderate, but unacceptable clover control was achieved within plots treated with sequential applications of Tenacity, with the higher rate providing greater control.

Crabgrass. Crabgrass (*Digitaria* spp.) populations increased within plots during the summer months, but only low to moderate levels of the grassy weed species were present on the final rating date. On 1 Aug, the greatest level of

crabgrass suppression was afforded by sequential treatments of Tenacity (Table 2). Statistically similar levels of crabgrass, however, were found within plots treated with Confront, Drive, Tenacity (single applications, both rates), and Q4. On the final rating date, crabgrass pressure was moderate and a total of 17% was observed within the untreated control plots. On 15 Aug, only plots treated with sequential applications of Tenacity provided complete control of crabgrass within the study. Acceptable levels of crabgrass control (≤ 5.0%) were achieved within plots treated with Drive, Tenacity (8.0 fl oz), and sequential applications of Q4. Poor control of crabgrass was exhibited within plots treated with Confront, Surge, Speedzone, Lontrel and Trimec Classic.

DISCUSSION

Except for Tenacity, all products evaluated provided good to excellent control of white clover after a single or sequential application. On the other hand, Tenacity (2 applications) was the only product that provided complete control of crabgrass when applied postemergently. Based on data from this study, various individual or combination products can provide excellent suppression of crabgrass and perhaps other weeds. Although unclear, the increased crabgrass populations within specific plots may have been caused by the rapid decline and control of clover which created voids in the canopy. For the greatest level of weed suppression where white clover and crabgrass are present, applications of products containing quinclorac may provide the greatest suppression of both species. In states where quinclorac is not registered (e.g., New York), multiple applications of Tenacity (≥ 3 applications) or application of separate products that provide white clover and crabgrass control may be necessary.

Table 1. Injury and percent white clover following the application of various herbicides to a Kentucky bluegrass lawn, 2008.

	Application[z]	Clover injury[y]			Percent clover[x]		
Treatment and rate per 1000 sq ft	timing	30 Jun	3 Jul	20 Jul	20 Jul	1 Aug	15 Aug
Confront 0.37 fl oz	A	1.7 de[w]	2.0 de	0.0 c	0 c	2 d	<1 cd
Drive 0.50 lb ai/A +MSO	A	1.7 de	2.0 de	0.0 c	0 c	1 d	0 d
Drive 0.75 lb ai/A +MSO	A	1.3 e	1.7 de	0.0 c	0 c	1 d	0 d
Tenacity 5.0 fl oz/a + X-77	A	0.3 e	1.3 ef	0.7 bc	67 b	47 b	27 b
Tenacity 8.0 fl oz/a + X-77	A	0.3 f	0.7 fg	0.7 bc	79 a	67 a	45 a
Tenacity 5.0 fl oz/a + X-77	AD	0.3 f	1.3 ef	1.7 ab	63 b	29 c	23 b
Tenacity 8.0 fl oz/a + X-77	AD	0.0 f	0.7 fg	2.3 a	77 a	18 c	11 c
Q4 3.0 fl oz	A	3.0 ab	3.0 bc	0.0 c	0 c	<1 d	0 d
Q4 3.0 fl oz	AD	2.7 bc	3.0 bc	0.0 c	0 c	0 d	0 d
Surge 1.5 fl oz	A	2.0 cde	2.0 de	0.0 c	0 c	0 d	< 1 cd
Surge 1.5 fl oz	AD	2.3 bcd	2.3 cd	1.0 bc	2 c	0 d	0 d
Speedzone 1.1 fl oz	A	3.0 ab	3.3 ab	0.0 b	0 c	1 d	<1 cd
Speedzone 1.8 fl oz	A	3.7 ab	4.0 a	0.0 c	0 c	0 d	0 d
Lontrel 0.25 fl oz	A	3.0 ab	3.0 bc	0.0 c	0 c	0 d	0 d
Trimec Classic 1.5 fl oz	A	2.3 bcd	2.0 de	0.0 c	0 c	0 d	0 d
Untreated	-	0.0 f	0.0 g	0.0 c	81 a	62 a	39 a

[z] Application timing was as follows: A = 26 Jun, D = 15 Jul.

[y] Injury to clover was visually rated on a 0 to 5 scale where 0 = no visible injury and 5 = entire plot area brown or dead.

[x] Percent plot area infested with clover was visually rated on a 0 to 100 percent scale where 0 = no clover present and 100 = entire plot area covered with clover.

[w] Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to Fisher's protected least significant difference test

Table 2. Percent crabgrass following the application of various herbicides for the control of clover in a Kentucky bluegrass lawn, 2008.

Treatment and rate per 1000 sq ft or acre	Application[z] timing	Percent crabgrass[y] 1 Aug	15 Aug
Confront 0.37 fl oz	A	11 b-f[x]	12 b-g
Drive 0.50 lb ai/A +MSO	A	2 ef	5 ef
Drive 0.75 lb ai/A +MSO	A	2 ef	2 f
Tenacity 5.0 fl oz/a + X-77	A	6 c-f	7 c-f
Tenacity 8.0 fl oz/a + X-77	A	5 c-f	5 def
Tenacity 5.0 fl oz/a + X-77	AD	0 f	0 f
Tenacity 8.0 fl oz/a + X-77	AD	0 f	0 f
Q4 3.0 fl oz	A	4 def	6 def
Q4 3.0 fl oz	AD	<1 ef	<1 f
Surge 1.5 fl oz	A	15 bcd	19 bcd
Surge 1.5 fl oz	AD	20 ab	24 ab
Speedzone 1.1 fl oz	A	11 b-e	10 c-f
Speedzone 1.8 fl oz	A	17 ab	19 bcd
Lontrel 0.25 fl oz	A	28 a	35 a
Trimec Classic 1.5 fl oz	A	15 bc	19 bc
Untreated	-	15 bcd	17 b-e

[z] Application timing was as follows: A = 26 Jun, D = 15 Jul.

[y] Percent plot area infested with crabgrass was visually rated on a 0 to 100 percent scale where 0 = no crabgrass present and 100 = entire plot area covered with crabgrass.

[x] Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to Fisher's protected least significant difference test.

Appendix 3. Phytotoxicity to the white clover and Kentucky bluegrass quality following the application of various herbicides for the control of white clover, 2008.

Treatment and rate per 1000 sq ft	Application[z] timing	Phytotoxcity[y] 30 Jun	Quality[x] 1 Aug	15 Aug
Confront 0.37 fl oz	A	23 efg[w]	7.7 abc	8.3 a
Drive 0.50 lb ai/A +MSO	A	17 fgh	7.3 bc	7.7 a
Drive 0.75 lb ai/A +MSO	A	13 ghi	8.0 ab	8.3 a
Tenacity 5.0 fl oz/a + X-77	A	5 hij	7.3 bc	7.7 a
Tenacity 8.0 fl oz/a + X-77	A	2 ij	7.0 cd	7.7 a
Tenacity 5.0 fl oz/a + X-77	AD	2 ij	6.3 de	8.3 a
Tenacity 8.0 fl oz/a + X-77	AD	0 j	6.0 e	8.3 a
Q4 3.0 fl oz	A	47 ab	8.0 ab	8.3 a
Q4 3.0 fl oz	AD	32 cde	7.3 bc	8.7 a
Surge 1.5 fl oz	A	25 efg	8.0 ab	7.7 a
Surge 1.5 fl oz	AD	28 def	8.0 ab	7.7 a
Speedzone 1.1 fl oz	A	43 abc	7.7 abc	8.0 a
Speedzone 1.8 fl oz	A	52 a	8.0 ab	8.0 a
Lontrel 0.25 fl oz	A	38 bcd	7.3 bc	7.7 a
Trimec Classic 1.5 fl oz	A	23 efg	8.3 a	7.7 a
Untreated	-	0 j	7.0 cd	7.7 a

[z] Application timing was as follows: A = 26 Jun, D = 15 Jul.

[y] Percent clover exhibiting phytotoxic symptoms was visually rated on a 0 to 100 percent scale where 0 = no injury present and 100 = entire plot area exhibiting phytotoxic symptoms.

[x] Overall quality of the Kentucky bluegrass was rated visually on 0 to 9 scale where 0 = entire plot area brown or dead; 6 = minimum acceptable quality for a home lawn; and 9 = optimum density and dark green color.

[w] Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to Fisher's protected least significant difference test