Herbicide Safety and Weed Control Comparison in Spring Seeded Kentucky Bluegrass

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TURFGRASS SCIENCE

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SUMMARY: Early spring preemergence herbicides are often necessary in Indiana to prevent troublesome annual grassy weeds such as crabgrass and goosegrass. However, all preemergence herbicides (except Tupersan) work to prevent the emergence of turfgrass seeds as well as weed seeds, so a turf manager cannot use a preemergence herbicide if they plan on seeding in the spring. Postemergence herbicides can also be used to control crabgrass and other weeds in spring when seeding turf. The objective of this experiment was to evaluate six products at three different application timings for use in establishing Kentucky bluegrass from seed in the spring. Kentucky bluegrass coverage was highest (38%) for Tupersan applied at seeding followed by Tenacity applied at seeding or at emergence (17 and 19%, respectively). Crabgrass coverage on 12 August was lowest for Tenacity applied at emergence. Two applications of post crabgrass products are needed for complete control when Kentucky bluegrass is spring seeded. These results support that 1) late summer and early fall is a better seeding date than the spring due to reduced weed pressure, and 2) two applications of a postemergence herbicide will be needed in spring seeded Kentucky bluegrass areas.

Early spring preemergence herbicides are often necessary in Indiana to prevent troublesome annual grassy weeds such as crabgrass and goosegrass. Additionally, these applications help to prevent the emergence of some broadleaf weeds. Most preemergence herbicides work to kill weeds by preventing cell division causing death to weed seedlings shortly after they germinate. All preemergence herbicides (except Tupersan) work to prevent the emergence of turfgrass seeds as well as weed seeds, so a turf manager cannot use a preemergence herbicide if they plan on seeding in the spring. As mentioned, Tupersan (siduron) may be used for preemergence control of annual grassy weeds in newly seeded cool-season turf. This herbicide is more expensive and short-lived, but it is the only safe preemergence herbicide to apply at the time of seeding.

Another strategy is to use a postemergence herbicide instead of a preemergence herbicide to control crabgrass and other weeds in late May and June that is safe to use on seedling turf. Options include Drive XLR8 (quinclorac), Quicksilver (carfentrazone), Tenacity (mesotrione), and SquareOne (quinclorac + carfentrazone). These products can be most safely used very soon after seeding to control crabgrass (see label for exact details on each turf species). If the seedlings are more mature (have been mown 2-3 times following their emergence) then other products such as Q4 Plus (quinclorac + sulfentrazone + 2,4-D + dicamba), Onetime (quinclorac + MCPP + dicamba), or Solitare (quinclorac + sulfentrazone) can also be used. The objective of this experiment was to evaluate herbicides at three different application timings for use in establishing Kentucky bluegrass from seed in the spring.

ADDITIONAL INDEX WORDS:
aminocyclopyrachlor; carfentrazone; Drive XLR8; Imprelis; mesotrione; *Poa pratensis*; QuickSilver; quinclorac; siduron; SquareOne; Tenacity; Tupersan.

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MATERIALS AND METHODS

The experiment was conducted at the W.H. Daniel Turfgrass Research and Diagnostic Center in West Lafayette, IN. The area had been fallow for a year and had a history of weed pressure. Kentucky

bluegrass was seeded on 19 May 2011 at 2 lbs/1000 ft^2 and plots were covered initial with a seed germination blanket to reduce seed movement prior to germination. The cover was removed prior to emergence following germination. Plots were also overseeded with large crabgrass, yellow nutsedge (tubers), ragweed, and purslane at the same time Kentucky bluegrass was seeded. Yellow nutsedge tubers, 10 per plot, were inserted 1 inch deep on a grid so plants could be counted.

Experimental design was a 7 (herbicides) × 3 (timings) factorial in a randomized complete block with three replications and an individual plot size of 25 ft^2. The seven herbicide treatments were Tenacity at 8 fl oz/A, Tupersan at 12 lb/A, Drive XLR8 at 64 oz/A, SquareOne at 12 oz/A, Imprelis at 4.5 fl oz/A, QuickSilver at 2.1 oz/A, and the untreated check. The three timings were day of seeding (19 May), at emergence (3 June), and 2 weeks after emergence (17 June). Plots were mown as needed at 3 inches. Plots were treated with herbicides on 19 May, 3 June, and 17 June. Herbicides were applied in 80 gpa water with a CO_2-pressurized sprayer at 30 psi. A non-ionic surfactant at the rate of 0.25 % v/v was included with the Tenacity treatments applied 3 June and 17 June. Plots were visually rated. All data were analyzed using SAS (SAS Institute, Inc). Means were separated using Fisher's protected least significant difference when F tests were significant at α=0.05.

.Results and Discussion

Kentucky bluegrass coverage was highest for Tupersan (38%) applied at seeding followed by Tenacity applied at seeding or at emergence (17 and 19%, respectively) (Table 1; Fig. 1). Although statistical comparisons cannot be made, Kentucky bluegrass establishment was poor compared to tall fescue (separate but adjacent experiment; Patton and Weisenberger, 2012) which highlights their differences in seedling vigor and establishment rate. Similar to results on tall fescue, purslane coverage in Kentucky bluegrass was generally highest among Drive XLR8 and Tenacity treatments (Table 2). Ragweed coverage was sporadic, but all treatments seemed to reduce ragweed coverage except Tupersan and the untreated check (Table 3). Crabgrass coverage on 12 August was lowest for Tenacity applied at emergence (Table 4). This highlights that two applications of post crabgrass products are needed for more effective control when Kentucky bluegrass is spring seeded. Prostrate spurge was present in Tenacity treated plots more than the other treatments on 12 August (Table 5). These results support that 1) late summer and early fall is a better seeding date than the spring due to reduced weed pressure, and 2) two applications of a postemergence herbicide will be needed in spring seeded Kentucky bluegrass areas.

The purpose of this experiment was to test the efficacy of a single application of specific products at a specific timing. However, as mentioned previously many of the product labels recommend more than a single application for best results and this is especially important with Kentucky bluegrass since it is slower to establish. Turf managers should use this research to help choose the optimum product and timing for an application with the intention to scout the location and make a follow-up application for weed control at a later date for best results and optimum establishment. In this experiment Tupersan applied at seeding provided best results followed by Tenacity when applied at seeding and emergence.

References

Patton, A. and D. Weisenberger. 2012. Herbicide Safety and Weed Control Comparison in Spring Seeded Tall Fescue. 2011 Annual Report - Purdue University Turfgrass Science Program.

Timing/Herbicide	Tenacity	Tupersan	Drive XLR8	SquareOne	Imprelis	Quicksilver	Untreated
At Seeding (19 May)							
At Emergence (3 June)							

Fig. 1. Turf and weed coverage on 13 June 2011 for the first two application timings and the seven herbicide treatments. These photos provide evidence of the effectiveness of the applications at seeding as well as some treatments at emergence. However, since only a single application was used in this experiment, final Kentucky bluegrass coverage was low except for Tupersan applied at seeding or Tenacity applied at seeding or at emergence.

Table 1. Herbicide effects on Kentucky bluegrass coverage.

Treatments		Kentucky bluegrass coverage		
Herbicide	timing	6 July	3 Aug	12 Aug
		%		
Tenacity	DOS [a]	17	12 b [b]	17 bc
Tupersan	DOS	20	25 a	38 a
Drive XLR8	DOS	33	2 c	1 d
SquareOne	DOS	12	0 c	0 d
Imprelis	DOS	15	0 c	0 d
QuickSilver	DOS	13	0 c	0 d
Untreated	DOS	17	0 c	0 d
Tenacity	AE	42	8 b	19 b
Tupersan	AE	43	0 c	0 d
Drive XLR8	AE	9	0 c	2 d
SquareOne	AE	35	0 c	0 d
Imprelis	AE	52	0 c	0 d
QuickSilver	AE	15	0 c	0 d
Untreated	AE	42	0 c	0 d
Tenacity	2WAE	20	1 c	7 cd
Tupersan	2WAE	47	0 c	0 d
Drive XLR8	2WAE	52	0 c	2 d
SquareOne	2WAE	17	0 c	0 d
Imprelis	2WAE	60	1 c	0 d
QuickSilver	2WAE	18	0 c	0 d
Untreated	2WAE	45	0 c	0 d
ANOVA				
Herbicide		NS	<0.0001	<0.0001
Time		NS	<0.0001	0.0039
Herbicide × Time		NS	<0.0001	<0.0001

[a] DOS = day of seeding; AE = at emergence; 2WAE = two weeks after emergence.
[b] Within columns, means followed by the same letter are similar.

Table 2. Herbicide effects on purslane coverage.

Treatments		Purslane coverage		
Herbicide	timing	6 July	3 Aug	12 Aug
		%		
Tenacity	DOS [a]	28 d [b]	23 c	13 de
Tupersan	DOS	0 h	7 de	6 ef
Drive XLR8	DOS	72 bc	20 cd	23 cd
SquareOne	DOS	17 defgh	2 e	2 ef
Imprelis	DOS	8 fgh	2 e	2 ef
QuickSilver	DOS	3 gh	1 e	0 f
Untreated	DOS	18 defg	7 de	2 ef
Tenacity	AE	90 a	73 a	63 a
Tupersan	AE	20 defg	6 de	2 ef
Drive XLR8	AE	87 ab	55 b	32 bc
SquareOne	AE	1 h	1 e	0 ef
Imprelis	AE	8 fgh	0 e	1 ef
QuickSilver	AE	0 h	1 e	0 f
Untreated	AE	22 def	6 de	3 ef
Tenacity	2WAE	75 abc	58 ab	42 b
Tupersan	2WAE	12 defgh	4 e	1 ef
Drive XLR8	2WAE	60 c	13 cde	6 ef
SquareOne	2WAE	22 def	3 e	1 ef
Imprelis	2WAE	28 d	0 e	0 ef
QuickSilver	2WAE	10 efgh	2 e	2 ef
Untreated	2WAE	27 de	6 de	3 ef
ANOVA				
Herbicide		<0.0001	<0.0001	<0.0001
Time		0.0003	0.0018	0.0082
Herbicide × Time		<0.0001	<0.0001	<0.0001

[a] DOS = day of seeding; AE = at emergence; 2WAE = two weeks after emergence.
[b] Within columns, means followed by the same letter are similar.

Table 3. Herbicide effects on ragweed coverage.

Treatments Herbicide	timing	Ragweed coverage 6 July	3 Aug	12 Aug
		%		
Tenacity	DOS [a]	4	0 c [b]	0 b
Tupersan	DOS	11	7 a	9 a
Drive XLR8	DOS	1	1 b	0 b
SquareOne	DOS	2	0 c	0 b
Imprelis	DOS	4	0 c	0 b
QuickSilver	DOS	6	1 bc	0 b
Untreated	DOS	10	0 bc	1 b
Tenacity	AE	0	0 c	0 b
Tupersan	AE	9	1 bc	0 b
Drive XLR8	AE	0	0 c	0 b
SquareOne	AE	0	0 c	0 b
Imprelis	AE	0	0 c	0 b
QuickSilver	AE	4	1 bc	0 b
Untreated	AE	4	1 bc	0 b
Tenacity	2WAE	0	0 c	0 b
Tupersan	2WAE	7	1 bc	1 b
Drive XLR8	2WAE	0	0 c	0 b
SquareOne	2WAE	0	0 c	0 b
Imprelis	2WAE	0	0 c	0 b
QuickSilver	2WAE	4	0 c	0 b
Untreated	2WAE	7	1 bc	1 b
ANOVA				
Herbicide		<0.0001	<0.0001	<0.0001
Time		0.0018	<0.0001	<0.0001
Herbicide X Time		NS	<0.0001	<0.0001

[a] DOS = day of seeding; AE = at emergence; 2WAE = two weeks after emergence.
[b] Within columns, means followed by the same letter are similar.

Table 4. Herbicide effects on crabgrass, and clover coverage.

Treatments		Coverage on 12 Aug	
Herbicide	timing	Crabgrass	Clover
		%	
Tenacity	DOS [a]	48 c [b]	0 b
Tupersan	DOS	33 c	7 a
Drive XLR8	DOS	73 b	0 b
SquareOne	DOS	97 a	0 b
Imprelis	DOS	92 ab	0 b
QuickSilver	DOS	98 a	0 b
Untreated	DOS	97 a	1 b
Tenacity	AE	2 d	0 b
Tupersan	AE	97 a	0 b
Drive XLR8	AE	47 c	0 b
SquareOne	AE	90 ab	0 b
Imprelis	AE	96 a	0 b
QuickSilver	AE	98 a	0 b
Untreated	AE	97 a	0 b
Tenacity	2WAE	35 c	0 b
Tupersan	2WAE	96 a	0 b
Drive XLR8	2WAE	85 ab	0 b
SquareOne	2WAE	93 ab	0 b
Imprelis	2WAE	88 ab	0 b
QuickSilver	2WAE	84 ab	0 b
Untreated	2WAE	97 a	0 b
ANOVA			
Herbicide		<0.0001	<0.0001
Time		NS	<0.0001
Herbicide X Time		<0.0001	<0.0001

[a] DOS = day of seeding; AE = at emergence; 2WAE = two weeks after emergence.
[b] Within columns, means followed by the same letter are similar.

Table 5. Herbicide effects on prostrate spurge coverage.

Treatments	Coverage on 12 Aug
Herbicide	Spurge
	%
Tenacity	7 a [a]
Tupersan	1 bc
Drive XLR8	4 b
SquareOne	1 bc
Imprelis	0 c
QuickSilver	1 c
Untreated	1 bc
ANOVA	
Herbicide	0.0004
Time	NS
Herbicide X Time	NS

[a] Within columns, means followed by the same letter are similar.