Herbicide Selection and Timing Influences Ground Ivy Control

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SUMMARY: Ground ivy (*Glechoma hederacea*), sometimes referred to as creeping Charlie, is a creeping perennial broadleaf weed that is a common weed in turf and difficult to control once established. Previous reports have documented the efficacy of fall applications for ground ivy control. The objectives of this experiment were to 1) determine which herbicides most effectively control ground ivy, 2) determine which application timing (fall vs. spring) is most effective, and 3) determine if any herbicide by application timing interactions exist. Herbicides containing 2,4-D, fluroxypyr, triclopyr, and aminocyclopyrachlor or mixtures of these ingredients provided the best ground ivy control. Fluroxypyr and metsulfuron provided better ground ivy control with fall applications than spring applications, but this is consistent with recommendations and previous research that suggest that fall applications of broadleaf herbicides are more efficacious when applied in the fall compared to the spring. However, most of the products used in the experiment provided similar levels of ground ivy control when used in either the spring or the fall. Thus, although timing is critical, proper herbicide selection is more critical for weed control. NOTE: State registration for Imprelis was cancelled and federal registration was later cancelled by the U.S. Environmental Protection Agency. This cancellation does not allow the continued use of Imprelis herbicide in the U.S. Any such applications are illegal.

Ground ivy (*Glechoma hederacea*), sometimes referred to as creeping Charlie, is a creeping perennial broadleaf weed that is a common weed in turfgrass and difficult to control once established. Among the cultural practices that typically control weeds, implementing recommended nitrogen fertilization practices (≥4 lbs N/1000 ft^2) are known to reduce ground ivy coverage compared to non-fertilized turf (Kohler et al., 2004) but it is unknown how mowing, irrigation, drainage, and soil compaction influence ground ivy populations. Despite a beneficial reduction in ground ivy from fertilization, herbicides are needed for effective control. Multiple experiments have revealed that triclopyr provides effective and consistent control of ground ivy (Kohler et al., 2004; Reicher and Weisenberger., 2007). Fluroxypyr has also been described as effective, though slightly less effective and consistent than triclopyr (Reicher and Weisenberger., 2007). Additionally, 2,4-D also effectively controls ground ivy when applied alone (Kohler et al., 2004) or when it mixed with 2,4-DP (dichlorprop) or MCPP (Vrabel et al., 1987; Borger et al., 2002). Tank-mixes with 2,4-D and triclopyr also increase control of ground ivy when tank-mixed with other herbicides (Olson and Wright, 1988; Vrabel et al, 1987). The activity of other herbicides is not fully known.

ADDITIONAL INDEX WORDS:
2,4-D; aminocyclopyrachlor; Banvel; Blade; clopyralid; dicamba; Dismiss; Escalade 2; fluroxypyr; Imprelis; Lontrel; MCPP (mecoprop); Mecomec 4; mesotrione; metsulfuron; Spotlight; sulfentrazone; Tenacity; triclopyr; Trimec Classic; Turflon Ester Ultra, TZONE.

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Fall applications are typically recommended for perennial broadleaf weed control with applications at or near the first frost are considered most effective. Previous reports have documented the efficacy of fall applications for ground ivy control (Reicher and Weisenberger, 2007). Efficacy was reported for applications of herbicide for ground ivy control anytime from 1 September to 1 November in West Lafayette, IN with some reduction in control from a late fall application on

15 November (Reicher and Weisenberger., 2007). Thus, a wide window of dates can be used in the fall to control ground ivy but little is known about how the efficacy of spring applications compares to fall applications. Many lawn care companies and home owners also treat weeds in the spring, including ground ivy, as this is when these weeds are more noticeable and homeowners generally have more interest and energy for yard work. The objectives of this experiment were to 1) determine which herbicides most effectively control ground ivy, 2) determine which application timing (fall vs. spring) is most effective, and 3) determine if any herbicide by application timing interactions exist.

Materials and Methods

The experiment was conducted at the W.H. Daniel Turfgrass Research and Diagnostic Center in West Lafayette, IN. The site was a Kentucky bluegrass blend with a uniform cover by ground ivy. Plots were mown at 2 inches. Experimental design was 2 × 14 factorial with three replications and an individual plot size of 25 ft^2. The two application timings were fall and the following spring. The fifteen herbicide treatments were 2,4-D ester, Banvel (dicamba), Blade (metsulfuron), Dismiss (sulfentrazone), Escalade 2 (2,4-D + fluroxypyr + dicamba), Imprelis (aminocyclopyrachlor), Lontrel (clopyralid), Mecomec 4 (mecoprop), Spotlight (fluroxypyr),Tenacity (mesotrione), Trimec Classic (2,4-D + mecoprop + dicamba), Turflon Ester Ultra (triclopyr), TZONE (triclopyr + sulfentrazone + 2,4-D + dicamba), and the untreated check.

Plots were treated with herbicide on 8 October 2010 (fall) or 13 April 2011 (spring). Herbicides were applied in 87 gpa water with a CO_2-pressurized sprayer at 30 psi. Ground ivy percent coverage was 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

The main effect of herbicide was significant on all fall rating dates (Table 1). When treatment effects were evaluated on 11 November – 1 month after herbicide application – ground ivy coverage was reduced more than 50% by 2,4-D ester, Escalade 2, Imprelis, Spotlight, and TZONE. This was consistent with our previous observations that herbicides containing 2,4-D, fluroxypyr, triclopyr, and aminocyclopyrachlor or mixtures of these ingredients provide the best ground ivy control.

When treatment effects were analyzed in the spring, there was a timing by herbicide interaction on 2 of the 3 rating dates and the main effect of herbicide was significant on all spring rating dates (Table 1). 2,4-D ester (fall), Imprelis (spring and fall) and Spotlight (fall) reduced ground ivy coverage most when rated on 8 July 2011 (2 months after application)(Figs. 1-6). The timing by herbicide interaction was present due to an inconsistent response from Blade, Spotlight, and Tenacity across seasons. Both Blade and Spotlight provided much better ground ivy control when applied in the fall rather than the spring. Tenacity did not provide acceptable control with either application timing but did appear to reduce ground ivy coverage most when applied in the spring. Tenacity is a product designed to control weeds best with sequential applications and two applications spaced 2 weeks apart at 8 oz/A should provide better ground ivy control than from the single application reported in this experiment.

It is not clear why Spotlight and Blade provided better ground ivy control with fall applications than spring applications, but this is consistent with recommendations and previous research that suggest fall applications of broadleaf herbicides are more efficacious when applied in the fall compared to the spring. However, most of the products used in the experiment provided similar levels of ground ivy control when used in either the spring or the fall. Thus, although timing is critical, proper herbicide selection is more critical for weed control.

Following the initiation of this experiment, the Office of Indiana State Chemist issued a stop sale, use, or removal order (SSURO) for the herbicide Imprelis due to injury to non-target vegetation (Patton et al., 2011). The herbicide was deemed to be MISBRANDED. This SSURO requires DuPont Professional Products to cease all sale, distribution and use of DuPont Imprelis herbicide in the State of Indiana, effective August 1, 2011. As a result, Imprelis may no longer be used in Indiana and product should be returned to DuPont via their recall and refund program. The objectives of this research were to evaluate the efficacy of Imprelis for weed control and these authors did not evaluate the safety of this herbicide on trees or shrubs.

References

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Table 1. Herbicide and timing effects on coverage of ground ivy.

			Ground Ivy Coverage				
Herbicide	rate	timing[a]	22 Oct 2010	11 Nov 2010	5 May 2011	7 June 2011	8 July 2011
			%				
2,4-D ester[b]	3 qt/A	fall	75 ab[c]	17 ef	2 ij	4 f	8 hi
2,4-D ester[b]	3 qt/A	spring			12 fghij		18 fgh
Banvel	1 pt/A	fall	80 ab	78 ab	43 abc	64 ab	88 ab
Banvel	1 pt/A	spring			32 bcde		87 ab
Blade	0.5 oz/A	fall	80 ab	68 ab	2 ij	7 f	17 ghi
Blade	0.5 oz/A	spring			18 efghij		80 abcd
Dismiss	8 oz/A	fall	28 d	23 de	27 cdef	69 ab	78 abcd
Dismiss	8 oz/A	spring			17 efghij		87 ab
Escalade 2	3 pt/A	fall	75 ab	20 def	4 hij	7 f	18 fgh
Escalade 2	3 pt/A	spring			20 efghi		18 fgh
Imprelis	4.5 oz/A	fall	32 d	9 ef	0 j	0 f	1 i
Imprelis	4.5 oz/A	spring			7 ghij		1 i
Lontrel	1.33 pt/A	fall	87 a	82 a	55 a	74 a	87 ab
Lontrel	1.33 pt/A	spring			40 abcd		83 abc
Mecomec	4 pt/A	fall	87 a	83 a	53 a	75 a	92 a
Mecomec	4 pt/A	spring			48 ab		87 ab
Spotlight	1.33 pt/A	fall	68 b	15 ef	1 ij	27 de	13 ghi
Spotlight	1.33 pt/A	spring			28 cdef		73 bcde
Tenacity	8 oz/A	fall	77 ab	63 b	28 cdef	54 bc	88 ab
Tenacity	8 oz/A	spring			45 abc		60 e
Trimec Classic	4 pt/A	fall	77 ab	42 c	19 efghi	38 cd	67 de
Trimec Classic	4 pt/A	spring			22 defgh		80 abcd
Turflon Ester Ultra	1 pt/A	fall	72 ab	35 cd	3 ij	14 ef	27 fg
Turflon Ester Ultra	1 pt/A	spring			23 defg		28 fg
TZONE	4 pt/A	fall	77 ab	22 def	4 hij	11 ef	28 fg
TZONE	4 pt/A	spring			17 efghij		33 f
Untreated Check		fall	78 ab	75 ab	28 cdef	77 a	70 cde
Untreated Check		spring			43 abc		75 bcde
ANOVA							
Timing					0.0046	NS	0.0001
Herbicide			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Timing × Herbicide					0.0545	NS	<0.0001

[a] Plots were treated with herbicide on 8 October 2010 (fall) or 13 April 2011 (spring).
[b] 2,4-D ester was mistakenly applied at above label rates at 2.85 lbs a.i./acre or 3 quarts/acre. The label allows for up to 2 lbs a.i./acre or 4.2 pints/acre. NOTE: Each 2,4-D product has unique labeling so refer to your label for specific use instructions.
[c] Within columns, means followed by the same letter are similar.

Fig. 1. Spotlight applied at 1.33 pt/A on 8 October 2010. Photo taken on 5 May 2011.

Fig. 2. Spotlight applied at 1.33 pt/A on 13 April 2011. Photo taken on 5 May 2011.

Fig. 3. Imprelis applied at 4.5 oz /A on 8 October 2010. Photo taken on 5 May 2011.

Fig. 4. Imprelis applied at 4.5 oz /A on 13 April 2011. Photo taken on 5 May 2011.

Fig. 5. 2,4-D ester applied at 3 qt/A on 8 October 2010. Photo taken on 5 May 2011.

Fig. 6. Untreated check plot. Photo taken on 5 May 2011.