

# Mowing and Herbicide Effects on Ground Ivy Control in Turf

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**SUMMARY:** Ground ivy (*Glechoma hederacea*), sometimes referred to as creeping Charlie, is a tough-to-control broadleaf weed in the mint family usually found growing in the shade. When attempting to control weeds, Extension bulletins and many herbicide labels recommend not to mow turf 1-2 days before or after application of a herbicide to maximize control. However, the effect of mowing on herbicide efficacy has not been sufficiently explored. The objectives of this experiment were to 1) determine which herbicides most effectively control ground ivy, 2) determine the optimum mowing schedule for weed control, and 3) determine if any herbicide by mowing timing interactions exist. The herbicide treatments were 2,4-D ester, Blade, Imprelis, Trimec Classic, Turflon Ester Ultra, and the untreated check at various timings before or after mowing. At no point in the experiment did the main effect of mowing have a significant impact on ground ivy coverage nor was there a significant mowing by herbicide interaction. Thus, this preliminary data suggests that whether or not turf is mown before or after an application may not be as important as previously thought. Imprelis, a herbicide no longer registered for use, was the most effective at controlling ground ivy. This experiment will be repeated in 2011-2012.

Ground ivy (*Glechoma hederacea*), sometimes referred to as creeping Charlie, is a tough-to-control broadleaf weed in the mint family usually found growing in the shade. When controlling weeds Extension bulletins (Boyd, 2004; Reicher et al., 2006) and many herbicide labels (Anonymous, 2009, 2011) recommend not to mow turf 1 to 2 days before or after application of a herbicide to maximize control. However, the effect of mowing on herbicide efficacy has not been sufficiently explored. Technology exists that can apply a herbicide directly to freshly cut leaf tips immediately (during mowing) following cutting (Henson et al., 2003; Jester et al., 2009) and this research has demonstrated that it is equally effective at controlling weeds to traditional broadcast spray applications to unmown areas

#### ADDITIONAL INDEX WORDS:

2,4-D; aminocyclopyrachlor; Blade, Imprelis; metsulfuron; triclopyr; Trimec Classic; Turflon Ester.

and the research also suggests that in some cases it can provide superior control (Jester et al., 2009). Thus, some research exists that contradicts the statements in Extension bulletins and herbicide labels. Therefore, we set out to determine whether or not mowing practices before or after mowing might affect the weed control with traditional broadcast herbicide applications. The objectives of this experiment were to 1) determine which herbicides most effectively control ground ivy, 2) determine the optimum mowing schedule for weed control, and 3) determine if any herbicide by mowing 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.

Experimental design was 3 × 6 Factorial with four replications and an individual plot size of 25 ft<sup>2</sup>. The three mowing timings were 1) mow 30 minutes prior to application, 2) mow 30 minutes after application, and 3) not mowed for 72 hours prior or 72 hours after application. These mowing treatments were designed to simulate a worst case scenario of mowing either immediately prior to

or after a mowing. Plots were mown at 2 inches removing 0.5-1.5 inches of Kentucky bluegrass leaf tissue (Fig. 1). Ground ivy was dispersed throughout the turf canopy (Fig. 2) at heights of 0.5 to 3.0 inches prior to mowing and the mowing treatments removed approximately 30-40% of the ground ivy leaf tissue (Fig. 3). The herbicide treatments were 2,4-D ester, Blade, Imprelis, Trimec Classic, Turflon Ester Ultra, and the untreated check. The herbicide was mostly dry on the leaf surface when mowing 30 minutes following an application; however, the deck of the mower was cleaned with a blower to remove debris after each plot was mown to reduce the potential to track herbicide from one plot to another (Fig. 4).

Plots were treated with herbicide 29 October 2010. Herbicides were applied in 87 gpa water with a CO<sub>2</sub>-pressurized sprayer at 30 psi. Ground ivy coverage was visually rated for percent cover. All data were analyzed using SAS (SAS Institute, Inc). The data were analyzed as a 3 × 5 Factorial without the untreated check and the coverage in the untreated check is shown in Table 1 for comparison purposes. Means were separated using Fisher's protected least significant difference when F tests were significant at  $\alpha=0.05$ .

### RESULTS AND DISCUSSION

When rated 17 November (3 weeks after application) there were no immediate visible effects of the herbicide treatments. However, on each spring rating date herbicide affected ground ivy coverage. When rated on 8 July 2011, the 29 October application of Imprelis reduced ground ivy coverage most. In this experiment, 2,4-D provided fair ground ivy control, but the rate of 2,4-D used in this study were applied at 1.4 times (ester) the label recommended rate which restricts no more than 2.0 lbs a.i./acre of 2,4-D. Thus, the level of ground ivy control would be expected to be less when applied at label rates. The excellent control of ground ivy from Imprelis was consistent with other research done with this product at this location.

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.

At no point in the experiment did the main effect of mowing have a significant impact on ground ivy coverage, nor was there a significant mowing by herbicide interaction. Thus, this preliminary data suggests that whether or not turf is mown before or after an application may not be as important as previously thought.

Thus far, our results with the products used in this experiment contradict statements in Extension bulletins (Boyd, 2004; Reicher et al., 2006) and herbicide labels that encourage mowing to be postponed before a herbicide application and agrees with research that documents good control of weeds when a herbicide is applied to a fresh wound (Henson et al., 2003; Jester et al., 2009). Despite this, we must caution that our results were obtained with the herbicides we selected on ground ivy with fall applications and that this experiment conducted on a different weed species, with different herbicides, or at a different timing could yield differing results. Our research on mowing after a herbicide application is novel and suggests that despite defoliation of a portion of the treated weed leaf by mowing, that enough treated leaf area remains for a herbicide to behave similarly to treatment of unmown areas. It is worth stating that not all Extension publications and herbicide labels recommend postponing mowing either before or after herbicide application as many do not mention any specific recommendations about mowing and the application. We will repeat experiment in 2011-2012.



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Fig. 1. Turf before mowing (left) and after mowing (right)



Fig. 2. Ground ivy appearance prior to mowing.



Fig. 3. Ground ivy appearance after mowing showing the full, partial, and lack of removal of ground ivy leaves following mowing. The mowing treatments removed approximately 30-40% of the ground ivy leaf tissue.



Fig. 4. The deck of the mower was cleaned with a blower to remove debris and reduce the potential to track herbicide from one plot to another.

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**Table 1.** Herbicide effects on coverage of ground ivy. Means averaged over mowing and replication.

| Herbicide                    | Product rate | Ingredient rate | Coverage    |                  |             |             |
|------------------------------|--------------|-----------------|-------------|------------------|-------------|-------------|
|                              |              |                 | 17 Nov 2010 | 29 April 2011    | 3 June 2011 | 8 July 2011 |
|                              | oz/A         | lbs a.i./A      | %           |                  |             |             |
| 2,4-D ester <sup>a</sup>     | 96           | 2.9             | 87          | 4 b <sup>b</sup> | 10 b        | 33 b        |
| Blade                        | 0.5          | 0.02            | 83          | 4 b              | 15 b        | 58 a        |
| Imprelis                     | 4.5          | 0.07            | 81          | 0 b              | 0 c         | 0 c         |
| Trimec Classic               | 64           | 1.4             | 85          | 12 a             | 20 ab       | 55 a        |
| Turflon ester ultra          | 32           | 1.0             | 82          | 14 a             | 29 a        | 56 a        |
| ANOVA                        |              |                 |             |                  |             |             |
| MOW                          |              |                 | NS          | NS               | NS          | NS          |
| HERBICIDE                    |              |                 | NS          | <0.0001          | <0.0001     | <0.0001     |
| MOW X HERBICIDE              |              |                 | NS          | NS               | NS          | NS          |
| Untreated check <sup>c</sup> |              |                 | 85          | 38               | 65          | 79          |

<sup>a</sup> 2,4-D ester was applied above label rates which allow up to 2.0 lbs a.i./acre. NOTE: Each 2,4-D product has unique labeling so refer to your label for specific use instructions.

<sup>b</sup> Within columns, means followed by the same letter are similar.

<sup>c</sup> Untreated check plots are shown for comparison purposes only and were not included in the analyses.