Iron-based herbicide for broadleaf weed management in lawns

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Photo 1: Ground ivy in a home lawn

Introduction:

Perennial broadleaved weeds, such as ground ivy, dandelion, henbit and plantain are often problems in lawns in New York State. For decades, homeowners as well as professional lawn and landscape managers have relied on the chemical herbicide 2,4-D, usually in combination with other herbicide products, to selectively manage broadleaf weeds. While these products do a good job of reducing weed populations and allowing lawn grasses to thrive, concerns about their fate in the environment and their impact on the health of humans, pets and wildlife exist. Alternative methods, including herbicides that would be considered "organic" or more environmentally-benign, have for the most part been non-existent. This presents one of the biggest challenges in lawn care to date.

In 2012 Educators with Cornell Cooperative Extension studied a new, iron-based herbicide named "Fiesta" which is designed to manage broadleaved weeds in lawns. Fiesta's active ingredient is Iron HEDTA (at 26.52%, with an actual iron content of 4.43%) and it is produced by Neudorff North America. Fiesta became legal to use in New York State in 2011. Although the product literature promises management of a long list of weeds, few independent studies existed at the time of this study.

It has been known for some time that many broadleaf weeds absorb iron more easily (and therefore find it to be phytotoxic) than most lawn grasses. Iron is a ubiquitous inorganic element in the environment and is present in both plants and animals. The risk to non-target organisms such as birds, mammals, bees and fish from an iron-based herbicide is considered low. The HEDTA in Fiesta is a chelating agent called hydroxyl ethylene diamine triacetic acid which keeps the iron soluble and readily available for plant uptake. According to Engage Agro, a US distributor for Fiesta, people and pets can re-enter an area after the spray is dry. Anyone using Fiesta must read and follow all of the directions on the product label.

Procedures and results:

To study Fiesta, plots measuring sixteen square feet each were established on two home lawns in Rensselaer County, New York. The plots contained Kentucky bluegrass, perennial ryegrass, and fine fescues. Weeds in the plots included broadleaf plantain (*Plantago major*), ground ivy (*Glechoma hederacea*), henbit (*Lamium amplexicaule*) and white clover (*Trifolium repens*). Treatment dates and frequency are found in Table 1.

Table 1. Treatment names, number of treatments and treatment dates

Treatment Name	Number of treatments	Treatment Dates
Early Two	2	June 8 , June 21
Early Three	3	June 8, June 21, July 5
Late Two	2	August 24, September 12
Late Three	3	August 24, September 12, October 9
Untreated	0	-

Five ounces of Fiesta were mixed with one gallon of water, and this mixture was sprayed at the highest rate allowed by the label, 10 gallons per 1,000 square feet rate for each application. There were eight replications of each treatment. A hand-held pressurized sprayer was used to make the applications. Untreated check plots allowed us to make sure no other factors were influencing the growth of the weeds and grasses.

Broadleaf plantain

Ten to 60% of the broadleaf plantain in each plot showed blackened, dead foliage within 24 hours of the first Fiesta application (Photo 1). The Two Early applications decreased broadleaf plantain on average by 66% by October. The Three Early applications decreased broadleaf plantain more quickly, reducing it by almost 100% by the end of July. Late Two plots had 92% less broadleaf plantain by early October, while Late Three plots showed similar results. The Early Three applications were therefore the most successful in managing broadleaf plantain, and the Two Late applications were more effective than the Two Early applications. An interesting side observation was that broadleaf plantain was managed more effectively in sunnier plots than in shadier plots.

Photo 2 shows broadleaf plantain 24 hours after being sprayed with Fiesta. A plot before any treatments were made is shown in Photo 3. The same plot , as seen in early July after two treatments were made on June 8 and June 21, is shown in Photo 4.

Ground ivy

Initially, the results for ground ivy appeared variable. One day after the first of the June treatments, between zero and 60% of the ground ivy in each of the Two Early and Three Early plots turned black and died. Seven days after these treatments, the results become more uniform, with 98% of the ground ivy eradicated from the plots. This number increased to 100% eradicated two weeks after the first treatment. Therefore, in June ground ivy was largely controlled with just one Fiesta application.

Ground ivy was not as easily managed during the later time period. In the Late Two plots, ground ivy was decreased by 55% two weeks after the first treatment, and to 98% after the second treatment. The results were similar for the Late Three plots. From this study it appears that ground ivy is more easily managed earlier in the season.

Henbit

Like those for ground ivy, the results for henbit after 24 hours were initially variable. One day after the first Early treatment, 30 to 80% of the henbit had turned black and died. However, one week after this first treatment, henbit was 100% gone from the plots. Henbit was not observed again in the plots until November 2, when 5% was seen in five Early plots. We were unable to determine if these were new seedlings or re-growth from plants which disappeared and were apparently killed in June.

White clover

White clover may or may not be desirable in lawns. White clover is prized for its drought tolerance, its ability to take nitrogen from the air and put it into the soil, and its usefulness as a food source for honeybees. However, white clover might be a liability in lawns where small children play or people who are allergic to bees stroll. Some people also object to white clover aesthetically.

Like the other weeds in this study, white clover initially showed a variable response to Fiesta. One day after the first Early treatment, between 0 and 60% of the white clover foliage was blackened and necrotic. One week after the first treatment, white clover was 100% gone from all of the plots. This was surprising, since during the Fiesta application to clover foliage, the product beaded and rolled off, and we did not expect such dramatic results.

Lawn grasses

Kentucky bluegrass, perennial ryegrass and fine fescues were observed to become darker green in color within hours of a Fiesta application. This darkening of the foliage lasted several weeks. Although Fiesta made the foliage a darker green, like nitrogen fertilizer would do, unlike nitrogen it did not increase the growth rate of the grasses.

A few plots were observed to show browning of the grass on July 12, but it was unclear whether Fiesta applications played a part, because this discoloration was inconsistent across the plots. No rain was recorded for the period June 12 to July 12, so the discoloration was most likely drought-induced. After July 12, rainfall resumed and all of the grass species turned green and remained green to the end of the study.

Conclusions:

Our study indicated weeds differ in their response to Fiesta. Henbit and white clover were controlled by one application in June. Ground ivy was largely controlled by one June application, but two applications were needed to control ground ivy in late summer/fall. Broadleaf plantain was tougher to manage. Two June applications provided about 66% control, while two applications later in the season worked better, and three were needed for 100% control. Plant response to Fiesta is greater in sunnier, warmer locations than in shadier, cooler locations.

While it may not manage all weed species and multiple applications might be needed in some cases, Fiesta could become a valuable tool for those who wish to use a product which appears to have a low environmental impact. Based on phone calls and questions received during lectures and diagnostic clinics, ground ivy is one of the most problematic weeds in turfgrass areas in the Capital District. Some home lawn owners have commented that they would be happy to tolerate other weeds if ground ivy could be reduced. Since Fiesta was shown to have good efficacy on ground ivy, it might be a useful product in these cases. Additionally, an herbicide scheme which used Fiesta to control the majority of the weeds but then spot-treated with a smaller amount of 2,4-D might also be possible.

When this study was first published (December 2012) Fiesta was available for $100.16 per gallon from internet retailers. As of this writing (January 2014) Fiesta is available on the internet for $73.00 per gallon. Since this is still significantly more expensive than variations of 2,4-D, it may not appeal to those who are budget conscious. It may be possible to make a Fiesta application cover more ground by using it at a lower labeled rate and by spot-treating only the weeds and not the lawn grasses. Other brands of iron-based herbicide are now on the market, and each will need to be evaluated for performance.

READ THE LABEL BEFORE APPLYING ANY PESTICIDE.

Fact sheet 7.462; January 2014. Written as a MS Publisher file