

APPLYING HERBICIDES EFFECTIVELY AND ACCURATELY. David W. Fischer, Associate Professor, Dane County Crops and Soils Agent, University of Wisconsin – Extension, Madison, WI 53718.

Herbicides can be an effective tool for the management and control of invasive weeds. However, to maximize product effectiveness, several factors need to be better understood by those applying and recommending herbicides in invasive plant settings. These can include a full understanding of the target plant, application equipment, and control options.

Many volunteers have at least a basic understanding of the plants they are charged to control. However, understanding how these characteristics interact with herbicide control is sometimes more limited. Herbicide application timing as it relates to life cycle is possibly the most important aspect. Garlic mustard *Alliaria petiolata* (Bieb.) Cavara & Grande produces seed very early in the growing season, yet I have seen herbicide applications being made to plants already setting seed as well as fielding phone calls with questions about using herbicides to control garlic mustard after seed set has begun. These applications will do very little to control the infestation. In contrast, herbicide applications made in winter to green plants may result in near complete control of seed production for the following season while almost eliminating risk to desirable species found at the application site.

Accuracy of herbicide applications weighs heavily on a strong understanding of spray equipment and label recommendations. In some situations, applicators may be able to use sprayers mounted on all terrain vehicles (ATV) and make an application with rates based on a per acre basis. This requires that applicators calibrate the sprayer to deliver a known rate. The easiest method to determine spray rate is as follows. 1) Measure the distance in inches between spray nozzles; 2) divide 8160 by the number from step 1. This represents the distance in feet to be traveled in a timed run. 3) Drive the ATV with the tank at least ½ full of water only at spraying speed the distance determined from step 2 recording in seconds how long it takes. 4) Operate the sprayer collecting output from several nozzles for the time determined from step 3. 5) Measure the output collected from nozzles in **ounces** and determine the average. 6) Take ½ of the output from step 5 (or divide by 2). This is the output in gallons per acre for the ATV mounted sprayer.

Sprayers setup to use one adjustable nozzle, either a backpack sprayer, hand pump, or CO₂ sprayer typically apply materials on a spray to wet or spray to runoff basis, depending on label recommendations. While each person will decide for himself or herself what spray to wet or spray to runoff means, control of sprayed plants is rarely affected by spray volume. To insure the proper amount of herbicide formulation is added to the spray tank, applicators must know the size of the spray tank. Below is a simple chart to help mix various common rates to tanks ½ to 2 ½ gallons in size.

Desired Volume	Amount of product					
	½%	1%	1 ½%	2%	5%	10%
½ gal	1/3 oz	2/3 oz	1 oz	1 1/3 oz	3 ¼ oz	6 ½ oz
1 gal	2/3 oz	1 1/3 oz	2 oz	2 2/3 oz	6 ½ oz	1 ½ cups
1 ½ gal	1 oz	2 oz	3 oz	4 oz	1 ½ cups	1 ¼ pints
2 gal	1 1/3 oz	2 2/3 oz	4 oz	5 1/3 oz	1 2/3 cups	1 2/3 pints
2 ½ gal	1 2/3 oz	3 1/3 oz	5 oz	6 2/3 oz	1 pint	2 pints

The question then becomes what product can be used. This afternoon’s speaker will go into the specifics on that topic and I will defer to both their presentation and abstract for the specifics. Each situation may have several viable options for use. No matter what product is used, applications must follow label directions. One website I have used to help consumers look at labels prior to purchasing the product is www.cdms.net.

Finally, I must discuss what has been referred to as the glyphosate saga. Once glyphosate came off patent, multiple glyphosate containing products were introduced. In an attempt to make the process easier, several organizations released publications recommending mixing rates based on percent active ingredient of the final mix. This has further confused the process and in fact results in rates that exceed maximum labeled rates – a direct violation of FEDERAL law. Unfortunately, these mixing recommendations have taken hold and we must now educate all users of finding the proper rate on the label and mixing accordingly. Because glyphosate is marketed in concentrations from ready to use containing 1 to 2% a.i. to concentrations exceeding 50% a.i., organizations fear removing the a.i. instructions will result in those ready to spray products being further diluted. Marketing personnel for the producers have worked hard to have the consumer understand they are purchasing a ready to use product not to be further diluted. In addition, labels on store shelf products rarely exceed 6 pages and have tables showing the number of ounces or tablespoons to add to one gallon of water to obtain the desired final concentration.

Herbicides can become an extremely effective and cheap method of control for invasive species. However, work needs to be done to insure applications are made both accurately as well as effectively. Proper timing and rate will be an excellent companion to hand removal of invasive species and can prevent damage to desirable species present in the site.