Chemical Application Methods for Herbaceous Weeds

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Several herbicide application methods are available to land managers for herbaceous weed control. We'll group these methods roughly into broadcast and directed applications. Regardless of the method used, herbicides must be applied uniformly and at the correct rate. Incorrect pesticide application can result in wasted chemical, poor weed control, excessive carryover, and damage to desirable vegetation.

Broadcast Herbicide Application

Broadcast applications consist of applying a spray solution uniformly over the entire treated area. The kinds of herbicides used are usually selective, such as aminopyralid in rangeland, and / or soil-active. When (1) herbicides are applied according to label directions and (2) the equipment is operated properly, broadcast applications are very effective for weed control and are safe on non-target plants.

Boom sprayers are commonly used for broadcast applications. A spray boom typically consists of several spray nozzles mounted in a row. Boom sprayers can be used to treat large land areas, roadsides, and agricultural fields and usually have excellent application uniformity. Boom sprayers are available for tractors, ATVs, trucks, airplanes, or helicopters and can be mounted in combination with gun sprayers. The primary disadvantage with boom applications is the difficulty in applying herbicide on rough, hilly, or rocky terrain (except for helicopter applications). A small boom, i.e., up to 10 ft wide, can be used with a backpack sprayer; this can work well for treating limited areas, especially in rough, rocky terrain. However, backpack sprayers are poorly suited for treating large areas due to the constant need to refill tanks.

Spot treatments are a variation on broadcast treatments where applications target specific weed patches instead of treating the entire field. This is especially useful for controlling slow-spreading weeds which form dense, patchy infestations. Backpack sprayers are a good tool for spot-treating small weed populations.

Gun sprayers can be used for either broadcast or directed applications. Truck-mounted gun sprayers are often used by road crews as an alternative to side-mounted booms. These sprayers are popular with land managers and county weed crews due to their large tank size and hose reels that allow weed treatment a short distance from the vehicle. Gun sprayers are commonly used to treat weeds along roadsides, ditchbanks, and fencerows. The primary disadvantages of gun sprayers are the tendency to miss hidden weeds and the difficulty in applying herbicides uniformly. Always carefully calibrate gun sprayers before use (don't rely on written sprayer specs) since application rates tend to vary from user to user. Gun sprayers also apply much higher gallons per acre (GPA) compared to backpack or boom sprayers.

With any broadcast spray application, nozzle selection and calibration are extremely important to successful weed control. Application rates of 10 to 20 GPA are typical.

Directed herbicide application

In contrast with broadcast applications, directed applications target individual plants. This makes it possible to apply less-selective herbicides such as glyphosate, imazapyr, or triclopyr precisely on individual plants without the risk of injuring non-target vegetation. However, directed treatments are only possible when target plants are discrete enough to be treated individually.

Spray-to-wet and low-volume applications are typically made on plant foliage using a backpack sprayer with a single-nozzle wand. Weed control crews often use the spray-to-wet method because it requires no calibration, relies on individual judgment, and allows the crew to work with dilute herbicide solutions. The spray solution is usually 0.5% to 2% herbicide product in water, and the applicator sprays each plant until the leaf surface is visibly wet. Do not keep spraying until excess herbicide solution starts dripping off the plant. Over-application wastes chemical, may injure non-target plants, and may decrease weed control.

Low-volume applications are similar to spray-to-wet treatments but use a more concentrated herbicide solution (1% to 5%) and apply about half as much solution to each plant. This method requires some calibration for the individual applicator, but it can save time, both in treatment of individual plants and in fewer tank refills.

These applications can be made using a spray shield (e.g., made from a milk jug) to guard against overspray or drift.

***Drizzle application*s** are made using a spray gun with a narrow-orifice disk, which shoots a long, thin stream of spray solution. The gun can be operated from a backpack, truck, or ATV. The spray solution is relatively concentrated, 5% to 20% of product, and may include crop oil to help penetrate woody tissue. The spray stream is aimed directly at the target plant or, for larger plants, waved over the canopy so that droplets fall on the leaves and stems.

This type of application resembles **thin-line** application, in which a thin stream of concentrated herbicide is applied around the stems of plants. (Thin-line is a variation on basal bark treatment and is usually used for large, woody plants.) Drizzle and thin-line techniques may overlap, e.g., when treating a dense, mixed-size stand of *Tamarix*.

Wick application. A wick applicator consists of an herbicide reservoir attached to a wiper made of absorbent material such as cotton rope, carpet, or sponge – kind of like a self-filling paint roller. It is used to apply highly concentrated herbicide solution (10% to 100% of product) by wiping it directly onto plant surfaces.

Wick applicators are available in sizes from small hand-held models to forty-foot tractor mounted wicks. They are used primarily to selectively treat weeds that are taller than non-target plants, e.g., in agricultural crops to treat annual weeds that have grown above a crop canopy. Wicks are rarely practical for non-crop and range applications since weeds frequently grow at different heights and on uneven ground, which prevents the wick from contacting a significant percentage of the targeted weeds. Handheld models can be used to selectively treat individual plants, but wick applications are very time-consuming compared to backpack sprayers. However, wick treatments have the advantage of being very directed, and the handheld equipment is relatively inexpensive.

Hand-held spray equipment

Purchasing the equipment

Hand-pump backpack sprayer, 3 to 4 gallon capacity. Many brands – Solo, Field King, SP Systems, etc., $80 to $150. Before you buy a sprayer, make sure you can get spare parts and a boom for it. Look for the following features:

- built-in pressure regulator
- diaphragm pump (better than a piston pump)
- switchable arm

CO_2 backpack sprayer. More expensive, but versatile and very consistent; the best choice for research or full-time use. Available through R&D Sprayers (co2sprayers.com).

Spray boom – at least 3 nozzles, 16 to 20 inches apart. $35 to $90.

- get flat-fan, 80-degree nozzles made of brass or steel (8002XR is a good type)
- rear-mounted booms are available

Accessories – measuring jug, dye tablets, flags, metronome

Look at local farm supply stores or Ben Meadows Company (benmeadows.com), Forestry Suppliers (forestry-suppliers.com), R&D Sprayers (co2sprayers.com), or others.

Making the application

Get to know the spray boom.

- select a good pressure
- spray on concrete to see how high to hold the boom

Calibrate!

Use flags or dye to keep track of your application.

- put a line of flags on each side of the field, spaced as far apart as your spray swath
- go directly toward the opposite flag
- pull the flags after you cross them to avoid confusion

Make sure the chemical gets mixed in as you fill the tank. Keep the spray solution mixed.
When you need to refill, disconnect the wand and set it down, or place a flag.

For spot treatments, use a percent solution; spray to wet, not to runoff.