

Maximizing the Efficiency of Hand Weed Spraying

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Applying herbicides with hand-held equipment, such as a backpack sprayer or a hose-end sprayer, is a common vegetation management practice in non-crop sites. But how accurate or efficient is the use of these types of equipment? Especially when most applications are based upon a percent concentration of herbicide rather than trying to use a specific rate of herbicide? We wanted to find out, so we conducted four herbicide sprayer calibration schools, with about 20 experienced applicators in each school in 2009/10. The schools were designed to train the participants on a simple calibration method, but also to investigate their application skills. The answers we obtained indicated the actual practice is not too good. The mean value for gallons per acre (GPA) for the spray school students over the four schools varied greatly between the types of equipment (see Table below). The last column in the table is the actual amount of glyphosate applied per acre if the concentration of the herbicide in the tank was 1% of the total spray mix, a commonly used concentration. The 1% concentration in the glyphosate label (Roundup Pro in this case) is meant to be roughly equivalent to 0.5 gallons per acre of herbicide product. On average the backpack spray was a little below this target rate while the orchard gun was nearly three times higher. The spot spray, which we calculated as the amount applied to treated plants, not the whole area, was more than 12 times the target rate. In all cases, the variation between students is large; more so with the orchard gun than with the backpack sprayer and off the charts when spot spraying.

So, what does all this mean and what can be done to improve efficiency? In the first place, applying the wrong amount of herbicide is a bad idea. Apply too little and it won't work, which usually means another trip to get the job done right. Too much and you waste product, time, haul more water than you need to the site, and increase the chances of environmental contamination or off-site movement. The two key factors that can eliminate this inefficiency are learning to apply herbicides according to a rate rather than a concentration and to calibrate the sprayer (which means the equipment and the applicator) before applying herbicide. We used the 128th acre calibration method in our training with our spray school students. It is a simple, no math method that is easy to use. Go to http://ucanr.org/sites/socalinvasives/Research_Papers/Brochures/ for a worksheet for the method.

Table. Gallons per acre (GPA) data from herbicide sprayer calibration training; mean of 80 students.

Sprayer type	Mean GPA	GPA Range	1% glyphosate Gallons/acre
Backpack	41	10-100	0.41
Orchard Gun	127	24-352	1.3
Spot Spray	628	80-1560	6.3