Calibration of Non-Crop Sprayers

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Herbicide labels list application rates in terms of surface area sprayed. But many land managers apply herbicides based on percentage of active ingredient in the spray solution. The result often leads to over-application of herbicide.

We conducted several one-day training sessions to educate practitioners on safe, effective, and efficient herbicide application practices. Each class began and ended with a short pre-test on herbicide labels, application, and calibration.
Classroom topics included:

1) Basic principals of pesticide application.
2) Herbicide labels: caution words, formulation, dosage information.
3) Difference between dosage and concentration.
4) Gallons per Acre (GPA) and what it means in practice.
5) Droplet Size, coverage, and drift.
6) Principles and methods of calibration.
7) Adjuvants.

The field session focused on the 1/128 method of sprayer calibration. The 1/128 method is named for the 128 ounces in a fluid gallon. The area used for calibration, 340 square feet, equals 128^{th} of an acre; thus the ounces of spray applied equals gallons per acre. Each participant received a clipboard with a built-in calculator and embossed with easy fill-in-the-blank steps for calibration.

The field session included stations with an orchard spray gun, broadcast sprayer, or spot sprayer. Instructors demonstrated proper application technique and how to calibrate each sprayer. Each participant then used each sprayer and their GPA recorded. GPA varied greatly among individuals and sprayers. The broadcast backpack sprayer applications had the lowest and least variable GPAs, ranging from 11-94 GPA for the 62 participants. Spot sprayer calibration varied wildly, from 71-1561 GPA for the actual area treated. These results indicate orders of magnitude of over-application if these applicators apply herbicide based upon percentage of active ingredient in the spray solution rather than pounds applied per acre.

GPA varied directly with group attitude or experience. Groups insistent on spraying to runoff had very high GPA’s. But GPA’s were greatly decreased when a group of applicators that frequently applied herbicide in hot weather and rugged terrain realized that lower GPA’s would mean far fewer trips to fill up the sprayer or greater need to carry additional water. It was difficult for some participants to realize that increasing the amount of herbicide applied had negative consequences and often did not increase

control. Field demonstrations comparing weed control using different GPA’s and application rates may help educate practitioners, but perhaps only over the long term.