United States Department of Agriculture
Natural Resources Conservation Service
Technical Note No: TX-PM-12-04
July 2012

Compressed Air Sprayer Calibration

Plant Materials Technical Note

Background

Compressed air sprayers, or pump up handheld sprayers, are common fixtures on many farms and ranches. They provide a fast and effective method of spot treatments for weed, insect, disease and fertilizer applications. These sprayers allow farmers and ranchers to treat small problem areas where treating an entire area may not be cost effective. Compressed air sprayers come in many different shapes and tank sizes, but the basic concept is the same. A pump is used to build pressure inside the tank that releases the spray once the trigger is pulled. Pumps can be operated either by hand or electrically. Tank sizes generally range from one gallon up to fifteen gallons. Spraying systems are designed to be carried by hand, fixed with straps to be carried as a backpack, or mounted on an UTV, ATV or pickup. A hand gun gives the operator control of when and how long to spray.

Purpose

The purpose of this technical note is to provide a step-by-step guide for calibrating compressed air sprayers. Unless a sprayer is calibrated accurately, it is impossible to apply a pesticide at a recommended rate. It doesn't matter if it is a large commercial sprayer or a small, hand-held pump-up sprayer. A properly calibrated sprayer will prevent additional cost from applying too much chemical, maximize efficiency of the chemical being applied by ensuring adequate rates for satisfactory results, and prevent damage to wildlife and water due to over application (Small Sprayer Calibration, 2006).

Methods for Sprayer Calibration

Different calibration methods can be used for compressed air sprayers. This tech note dicusses the 1/128th acre method (Murphy and Waltz, 2011) and the 200-500 square foot method (Small Sprayer Calibration, 2006). No one method is any better than another. The best method is the one that is easy to understand and perform. Some materials needed for calibration include:

- a measuring tape
- marking flags
- a graduate cylinder, measuring cup, or disposable syringe
- bucket or similar container to catch spray
- calculator

The 1/128th acre Method

1. Mark off a calibration plot that measures 18.5ft by 18.5ft (1/128 acre)
2. Fill sprayer to normal capacity with water
3. Pump sprayer to the pressure normally used for the herbicide application
4. Spray water over the plot area while maintaining normal and constant operating pressure
5. Record the time (seconds) to spray the test plot
6. Spray again for the recorded time, catching the spray to be measured. Measure the volume of water in fluid ounces. This equals the amount of gallons applied per acre
7. Divide the tank capacity by the spray output to calculate the decimal fraction of an acre covered by each tank of spray
8. Determine the volume of product recommended per acre
9. Multiply the volume of product per acre by the fractional acre covered per tank (Step 7) to determine the amount of product to add per tank
10. Disposable syringe, tablespoon, or small measuring cup works well for adding small amounts of pesticide (Dorn, 2011).

Example:

A 1-gallon spray tank puts 17 fl oz out in 28 seconds, which is the equivalent of 17 gallons per acre

Each tank will cover 1 gallon/17 gallons/acre, which equals .059 acre

If the pesticide rate is 1 qt (32 fl-oz), 32 fl-oz/ac x 0.059 ac/tank

* 1 fl-oz should be added each time the tank is filled

200-500 Square Foot Test Method

1. Measure a test area of 200 to 500 sq. ft
2. Fill sprayer with water to either a marked level or with a measured amount
3. Uniformly spray area set up in Step 1
4. Release the air pressure and determine the amount of water used by either:
   a. Measure the remaining amount of water in the tank and subtracting from the total quantity required to fill the tank
   b. Measure the water required to refill the tank
5. Calculate the application rate of the sprayer

   Example:

   Measured area= 200 sq ft

   Water Sprayed= 1 qt (0.25 gal)

   Application Rate= 0.25 gal/ 200 sq ft or 1.25 gal/ 1000 sq ft
6. Calculate and measure the amount of material required to cover the treatment area

   For dry products, use the following formula

   oz/1,000 sq ft = recommended lb/A x 0.37

   For liquid products, use this formula:

   oz/1,000 sq ft = recommended qt/A x 0.73

Example:

We have a small block measuring 34 ft x 15 ft

Our rate on our pesticide is 1 qt/A or 32 fl oz/A

(32 X 0.73= 23.36 oz/ 1000 sq ft)

$$\frac{X \text{ oz}}{510 \text{ sq ft}} = \frac{23.36 \text{ fl oz}}{1{,}000 \text{ sq ft}} \qquad 1{,}000x = 11913.6$$

* 11.9 fl oz of pesticide needed to treat the area

Useful Conversion Factors

- 1 teaspoon (tsp) = 4.93 milliliters (ml)
- 3 teaspoons (tsp) = 1 tablespoon (tbsp)
- 2 tablespoons (tbsp) = 1 fluid ounce (oz)
- 16 ounces (oz) = 1 pint (pt)
- 2 pints (pt) = 1 quart (qt)
- 4 quarts (qt) = 1 gallon (gal)
- 128 ounces (oz) = 1 gallon (gal)
- 16 ounces (oz) = 1 pound (lb)
- 43,560 square feet (sq ft) = 1 acre (A)

Conclusion

Compressed air sprayers can be effective tools on the farm if they are kept in proper working condition. A proper understanding is the key to optimizing the full benefits of these sprayers. Proper maintenance and calibration will ensure success in applications for farm and ranch pests. As with any chemical application, safety should be taken at all times. Remember to always read and follow ALL instructions on the chemical label. Not only will it keep you safe, it is also the law.

References

Small Sprayer Calibration. Iowa State University, University Extension http://www.extension.iastate. edu/publications/pm1271.pdf. Revised October 2006 (March 2011).

Calibration of Hand-held and Backpack Pump-up Sprayers. Extension Agronomists Tim Murphy and Clint Waltz. The University of Georgia. http://commodities.caes.uga.edu/turfgrass/georgiaturf/WeedMngt /weedcontrol/BACKCALIB.pdf. (February 2011).

Calibrating Hand-Held Sprayers. Tom Dorn, UNL Extension Educator. University of Nebraska. http://lancaster.unl.edu/ag/factsheets/handspray.pdf. (March 2011).