



# FRUITS & VEGETABLES

## The Preparation of Small Spray Quantities of Pesticides

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### Quick Facts...

Pesticide labels often do not contain directions for mixing small quantities of spray

Accurate measurements of ingredients are important when mixing pesticides

The concentration of the active ingredient in the spray is critical to its effectiveness

An electronic scale is essential when measuring dry ingredients

Electronic scales are reasonably priced through on-line suppliers

Pesticides that are mixed by concentration generally have directions for application. Some insecticide application directions may state to apply until spray runs off. Some herbicide application directions may state to apply only enough spray material to wet leaves uniformly. If your pesticide mixing directions state an amount of formulated material per volume of spray (such as 100 gallons), you should adjust the amount of pesticide to the volume of water you mix. Table 1 gives mixing rates for label instructions that state application rates in amount of pesticide per 100 gallons. If your label instructions state a final spray concentration, you do not have to calibrate the sprayer, but **YOU MUST READ THE LABEL TO KNOW HOW MUCH SPRAY MATERIAL TO APPLY.**

If the pesticide mixing instructions state an application rate in an amount (typically lb., fl. oz., pt. or qt.) per area (usually acre, but sometimes 1000 sq. ft.), **YOU MUST CALIBRATE YOUR SPRAYER.** Calibration is simple. You must determine how much spray you apply for a known area. A sprayer may be used one way to spray insecticides, and another for herbicides. Calibration should be done with a sprayer that will be used for a particular application, in the same manner that the pesticide will be applied. Calibration is a three step process:

1. Put a known volume (V) of water in the sprayer. Spray the water out in the same manner the pesticide will be applied, then measure the area (A) that was sprayed.
2. To calculate the percentage (%) of an acre sprayed by V, divide A (expressed in sq. ft.) by 43560. If V=1 gallon, and the spray covered 1075 sq. ft., then the area treated by 1 gallon is 1075/43560 or 0.0247 acre.
3. Mix only enough spray to cover the area. If you need to spray 2000 square feet and it takes 1 gallon to cover 1075 square feet, dividing 2000 by 1075 gives you the number of gallons of spray. In this case, 1.86 gallons are needed to cover the 2000 square foot area.

To calculate the amount of pesticide required for each gallon of spray, multiply the rate per acre by the percent you determined in step two above. In this problem, the answer was 0.0247. Use the conversion factors in Table 2 to convert weight or volume into a measure that you can measure with your equipment.

### Accuracy is Important

Densities of solid pesticides vary with the formulation and the amount of shaking or settling within the package during shipping and storage. Use an electronic scale to ensure that the correct weight of the dry product is used. These scales are readily available on-line and reasonably priced. Many of these scales measure down to 0.1 gram. The use of an electronic scale is essential for the solid form pesticides (e.g., wettable powders, dry flowables, etc.).

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Do not use an ordinary teaspoon for measuring liquids as the common teaspoon varies from 4 to 10 ml. Use a graduated spoon. When measuring out small amounts, use a syringe marked in cubic centimeters (cc). One cc equals one ml. Syringes are available from your physician, veterinary supply, farm supply or pharmacy. Graduated spoons and syringes used for a pesticide must not be used for anything other than that pesticide. Always read and follow label directions.

**Table 1. Conversion values for preparation of 1, 3, and 5 gallons of spray from the rate per 100 gallons.<sup>2</sup>**

Type of Material	Amount per:			
	100 gallons	5 gallons	3 gallons	1 gallon
<b>Wettable Powders, and Dry Flowables</b>	4 pounds [lbs] (1,814.3 grams)	90.7 g or 3.19 ounces	54.4 g or 1.92 ounces	18.1 g or 0.63 ounces
	2 lb (907.2 g)	45.4 g or 1.659 ounces	27.2 g or 0.95 ounces	9.1 g or 0.32 ounces
	1 lb (453.6 g)	22.7 g or 0.79 ounces	13.6 g or 0.48 ounces	4.5 g or 0.16 ounces
	8 oz. (226.8 g)	11.3 g or 0.39 ounces	6.8 g or 0.24 ounces	2.3 g or 0.08 ounces
	4 oz. (113.4 g)	5.7 g or 0.2 ounces	3.4 g or 0.11 ounces	1.1 g or 0.04 ounces
	2 oz. (66.7 g)	2.8 g or 0.06 ounces	1.7 g or 0.05 ounces	0.6 g or 0.02 ounces
<b>Liquids: Liquid Concentrates, Emulsifiable Concentrates, and Liquid Flowables</b>	1 gallon (3,840 ml)	192 ml 12 Tablespoons + 2 teaspoons + 2.0 cc	115 ml 7 Tablespoons + 2 teaspoons or 10 cc	38.4 ml 2 Tablespoon + 1 teaspoon + 0.9 cc
	2 quarts (1,920 ml)	96 ml 6 Tablespoons + 1 teaspoon + 1.4 cc	57.5 ml 3 Tablespoons + 2½ teaspoons	19.2 ml 1 Tablespoon + ¾ teaspoon + 0.45 cc
	1 quart (960 ml)	48 ml 3 Tablespoons + ½ teaspoon + 0.5 cc	28.8 ml 1 Tablespoon + 2¾ teaspoons + 0.5 cc	9.6 ml ¾ teaspoon + 1.05 cc or 9.6 cc
	1 pint (480 ml)	24 ml 1 Tablespoons + 1¾ teaspoons + 0.25 cc	14.4 ml 2¾ teaspoons + 0.65 cc or 14.4 cc	4.8 ml ¾ teaspoon + 1.05 cc or 4.8 cc
	1 cup (8 fluid ounces = 240 ml) or 16 Tablespoons	12 ml 2½ teaspoons or 12 cc	7.2 ml 7.2 cc	2.4 ml 2.4 cc
	4 fluid ounces (120 ml) or 8 Tablespoons	6 ml 1 teaspoon + 1.0 cc or 6 cc	3.6 ml 3.6 cc	1.2 ml 1.2 cc
	2 fluid ounces (60 ml) or 4 Tablespoons	3 ml ½ teaspoon + 0.5 cc or 3 cc	1.8 ml 1.8 cc	0.6 ml 0.6 cc
	1 fluid ounce (30 ml) or 2 Tablespoons	1.5 ml 1.5 cc	0.9 ml 0.9 cc	0.3 ml 0.3 cc

<sup>2</sup> The measurements in tablespoons and teaspoons are approximate. The use of an electronic scale and syringe will be much more accurate.

**Table 2. Conversion Factors.**

<b>1. For wettable powders (W) and dry flowable (DF) formulations:</b>	1 lb = 453.6 grams; 1 oz = 28.4 grams	<b>3. For liquids</b>	
		1 cubic centimeter	1 milliliter
<b>2. For liquids:</b>	1 gal. = 4 qts. = 8 pts. = 16 cups = 128 fl. oz. = 256 Tbsp = 768 tsp; 1 fl. oz. = 2 Tbsp = 6 tsp = 30 ml	¼ teaspoon	1.25 ml
		½ teaspoon	2.5 ml
		¾ teaspoon	3.75 ml
		1 teaspoon	5 ml
		1½ teaspoon	7.5 ml
		1 Tablespoon	15 ml