Extension Pesticide Applicator Training Series–#5 Calculating Pesticide Amounts for Broadcast Applications

Guide A-614

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This publication is scheduled to be updated and reissued 2/11.

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5. **Calculating Pesticide Amounts of Broadcast Applications**

Broadcast pesticide applications are widely used through a range of settings that include agriculture, rangeland, and urban. Proper application of pesticides is critical to maximize performance of products applied. Over-application can result in undesirable crop/plant injury, while applications below labeled rate can reduce product performance. To avoid misapplications, proper calibration of the sprayer (see #4 "Sprayer Calibration" of this series) and area to spray the pesticide (see #3 "Treatment Area Measurements") are critical. Once these are correctly determined, one can calculate the amount of pesticide necessary (assuming the rate of application of the product is known). ***Always consult and follow the product label when mixing and applying pesticides, as it contains specific instructions, application rates and restrictions for the product.***

When preparing to mix pesticides, several factors need to be considered including 1) the calibrated output of the sprayer, 2) surface area to be treated, 3) size of the spray tank, and 4) the amount of product and water to add. Items 1 and 2 have been addressed previously in the Applicator Training Series, as noted above. Once the area to be treated and the sprayer output volume are known, one can calculate the amount of total spray solution necessary for the application. Please note that if large acreage will be applied, several tank mixes may be necessary.

Pesticides that are broadcast are produced in a range of solid and liquid formulations. Rates of application are given on the label in terms of product (solid or liquid) per area, but can also be expressed in terms of amount of active ingredient. The active ingredient is the chemical that exerts the desired effect on the target pest (e.g. weed, insect, fungi), while the product includes inert ingredients that do not affect the target pest directly. Calculating rates of applications in active ingredients allows applicators the flexibility and accuracy to apply products that have the same active ingredient, but at different proportions at the same rate. All labels list the amount of active ingredient each product contains, with solid pesticides as a percentage and liquid formulations as the weight of active ingredient per volume (e.g. lbs/gal). Some products use acid equivalent (ae) compared to active ingredient (ai). Acid equivalent is referenced when the active ingredient is an acid; therefore it is more accurately represented in this form without the inert salt as part of the active ingredient weight.

IMPORTANT POINTS:
- These calculations use amounts of product, not active ingredients.
- Make sure to account for extra spray solution needed to fill lines and pumps of sprayer.
- Follow mixing and application methods as outlined on the product label.

TANK MIXING TWO OR MORE PRODUCTS

When tank mixing two or more pesticides, the same equations are used as above. Calculating the product needed is identical with both dry and liquid products. However, when calculating the amount of water to add, for liquid products, one must subtract the volume of **all** products to be tank mixed. For dry products, less water will be necessary, but it may not be equivalent to the volume of solid product. We recommend adding the dry product to a partially filled tank, agitating the solution, and then filling up the tank to a mark that indicates the proper overall spray volume. Always consult the label before tank mixing products as some products will not work well if mixed in the same spray tank.

CALCULATING THE AMOUNT OF PRODUCT AND WATER NEEDED

Below is an equation and example of how to calculate the amount of product and water needed for a broadcasted application. When making calculations, it is critical that one makes the appropriate conversions.

AMOUNT OF PRODUCT EQUATION:

$$[\text{Area to be treated}] \times \frac{[\text{volume or weight of product}]}{\text{area}} = \text{Weight or volume of product needed}$$

AMOUNT OF WATER EQUATION:

([Output per area] x [Area to be treated]) - [volume of product] = Volume of water to add

Example:

A recommendation is written for the application of 4 pints/Acre of Trimec Classic to 10,000 ft.^{2} within 10 gal./Acre of spray solution. How much Trimec Classic and water are needed?

Must convert units to calculate:

10,000 ft^2 x (1 Acre/43,560 ft.^{2}) = 0.2296 Acres; 4 pints/Acre x (1 gal./8 pints) = 0.5 gallons

$$[0.2296 \text{ Acres}] \times \frac{[0.5 \text{ gal. Trimec Classic}]}{\text{Acre}} = 0.115 \text{ gal. Trimec Classic}$$

$$\left(\left[\frac{10 \text{ gal. solution}}{\text{Acre}}\right] \times [0.2296 \text{ Acres}]\right) - [0.115 \text{ gal. of Trimec Classic}] = 2.18 \text{ gallons of water}$$

CALCULATING THE RATE OF ACTIVE INGREDIENT APPLIED

Liquid products:

Below is an equation and example of how to calculate the rate of active ingredient being applied for a broadcasted application from a liquid product.

$$\frac{\left[\frac{\text{volume of product}}{\text{Acre}}\right]}{\left[\frac{\text{weight of active ingredient}}{\text{volume of product}}\right]} = \frac{\text{weight of active ingredient}}{\text{Area}}$$

Example:

A recommendation is written for the treatment with Weedar 64 (3.8 lbs. ai/gal.) at a rate of 0.5 gallons/Acre. How much active ingredient of Weedar 64 (2,4-D) is needed?

$$\frac{\left[\frac{0.5 \text{ gallons Weedar 64}}{\text{Acre}}\right]}{\left[\frac{3.8 \text{ lbs. A.I.}}{\text{gal. Weedar 64}}\right]} = \frac{1.9 \text{ lbs. ai}}{\text{Acre}}$$

Solid products:

Below is an equation and example of how to calculate the rate of active ingredient being applied for a broadcasted application from a solid product.

$$\frac{\text{weight of product to apply}}{\text{Area}} \times [\%\text{ active ingredient in product}] = \frac{\text{weight of active ingredient}}{\text{Area}}$$

Example:

A recommendation is written for the treatment with Telar (75% Telar) to be applied at 1.5 ounces/Acre. How much of the active ingredient of Telar (chlorsulfuron) is needed?

$$\frac{1.5 \text{ ounces Telar}}{\text{Acre}} \times [0.75 \text{ active ingredient in product}] = \frac{1.025 \text{ ounces of active ingredient}}{\text{Acre}}$$