PURDUE PESTICIDE PROGRAMS

Purdue University Cooperative Extension Service

PESTICIDE SAFETY AND CALIBRATION MATH FOR THE HOMEOWNER

Fred Whitford, Coordinator, Purdue Pesticide Programs
Andrew Martin, Specialist, Purdue Pesticide Programs
Roy Ballard, Purdue University Cooperative Extension Educator

Edited by
Arlene Blessing, Purdue Pesticide Programs

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How Do I Choose the Right Pesticide?

The pesticide selection process begins once all other avenues of control have been exhausted. Start by asking yourself these questions:

• What is the pest?

> Accurate identification of the pest is essential to selecting a pesticide because pesticides are categorized according to the pest or problem that they control. For instance, insecticides control insects, herbicides control weeds, and fungicides control plant diseases—yet all of these are *pesticides.* Know what the pest is and, therefore, what type of pesticide you need to control it.

• What is the site of application?

> Pesticide products are labeled according to the site of application; e.g., one flea control product might be labeled for outdoor use on turf, another for indoor use on carpets, and yet another for use on pets. Therefore, it is essential to identify the site to which the chemical will be applied.

• What formulation is best for the pest and site?

> Pesticides are packaged in a variety of dry and liquid formulations. Determine what formulation best suits your situation by considering the location and any related human, wildlife, or environmental elements; also consider application and safety equipment required, etc. Ready-to-use products are handier than concentrates that require dilution and mixing; they often come in containers designed to double as the application device and usually require only basic safety equipment. Although they may be more expensive, their convenience often justifies the cost.

• How many applications will be necessary to achieve the desired level of control?

> Sometimes follow-up applications are necessary, so estimate the total number that will be required, up front.

• How much pesticide will be needed, totally?

> Calculate the total amount of pesticide or fertilizer that will be needed in a given application season or year: Multiply the amount needed for one application times the estimated number of applications required.

• Is it always wise to buy in quantity to get the best price?

> Choose the quantity of product based on anticipated need, not just the best value. Excess pesticides in storage may lose their effectiveness, over time, and eventually require disposal—which often is not easily accomplished. Plan ahead and purchase only in quantities that can be used efficiently within the same year.

WHY ARE CALCULATIONS IMPORTANT?

Using just the right amount of pesticide and fertilizer minimizes the potential for personal, property, or environmental damage and maximizes consumers' return on the dollar. This publication will assist the homeowner in selecting products and calculating application rates for pesticides and lawn and garden fertilizers commonly used around the home.

HOW DO I CALCULATE THE AREA TO BE TREATED?

Typically, use rates for lawn care products are stated *per 1000 square feet* or *per acre.* Rates for flowers, shrubs, and vegetables often are given *per 100 square feet.* To determine how much pesticide or fertilizer is needed to do a job, first calculate the size of the area to be treated.
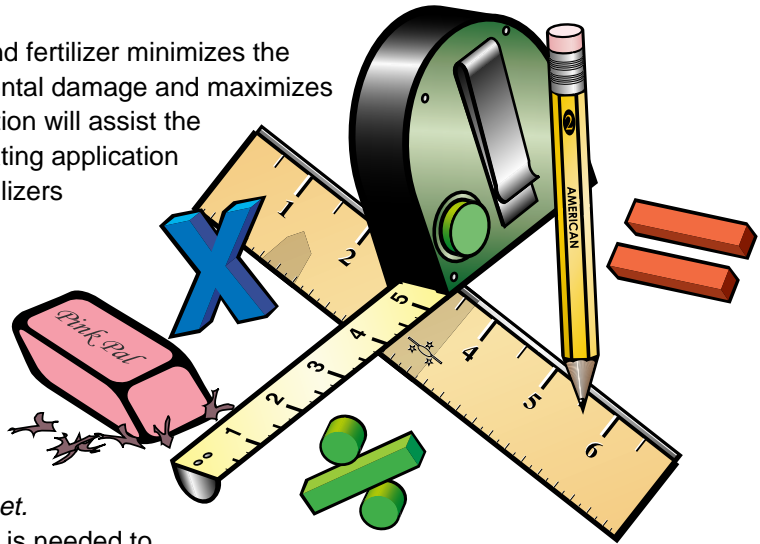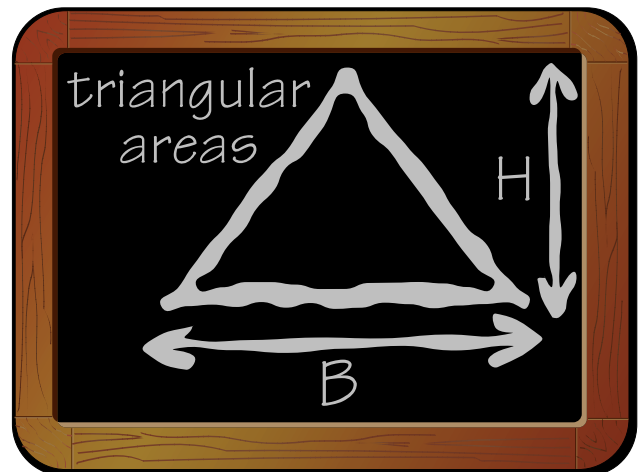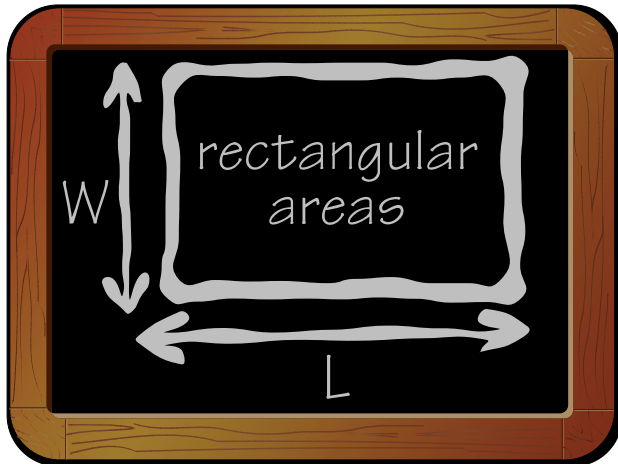
Square or Rectangular Areas

The area of a square or rectangle is determined by multiplying the length times the width:

Area = L x W

A rectangular area measuring 80 ft by 60 ft equals 4800 square feet:

Area = 80 ft x 60 ft

$= 4800 \text{ ft}^2$

Triangular Areas

The equation for calculating the area of a triangle is as follows:

Area = (Base x Height) ÷ 2

If the base of a triangular area is 200 ft and the height is 40 ft, the equation would be
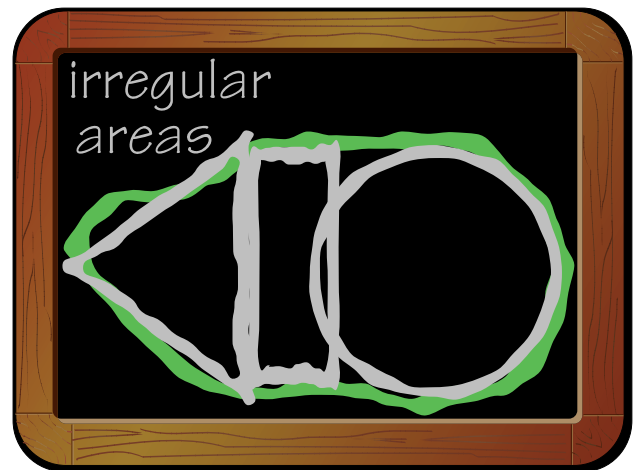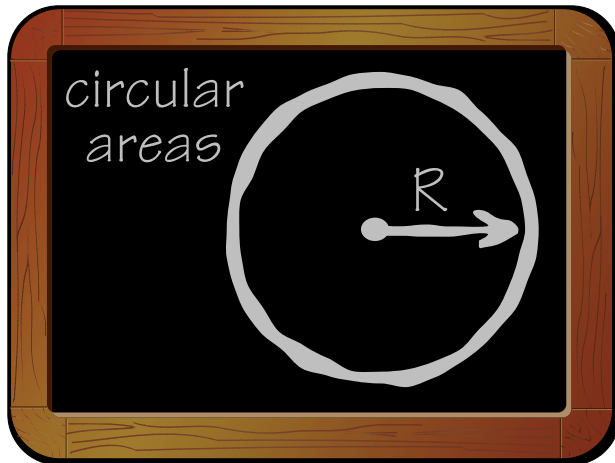
Area = (200 ft x 40 ft) ÷ 2

$= 4000 \text{ ft}^2$

Circular Areas

The area of a circle is determined by using the equation πr^2, or 3.14 x the squared radius of the circle:

Area = 3.14 x r^2

A circular flower bed measuring 40 ft in diameter would have a radius of 20 ft, so:

Area = 3.14 x 20^2

= 3.14 x (20 ft x 20 ft)

= 1,256 ft^2

Irregular Areas

Irregularly shaped flower beds, etc., usually can be divided into smaller, geometric areas (square, rectangle, circle, triangle) to facilitate total area calculation. Simply calculate the area for each individual shape and add them together. Conversely, it may be necessary to compute the total square footage of structures within the area which will not be treated—buildings, patios, sidewalks, ponds, etc.—and subtract it from the overall area.

HOW MUCH DO I NEED TO MIX?

Read the product label for specific instructions on the amount to mix. Some sample calculations follow.

Example A

A product label says to use 3 ounces per 1000 square feet. How much product will you need for a 4800-square-foot area?

4800 ft^2 ÷ 1000 ft^2 = 4.8 (units of 1000 ft^2)

4.8 x 3 oz = 14.4 oz of product

CONVERSIONS			ABBREVIATIONS		
1 gallon	=	16 cups	1 gal	=	16 C
	=	8 pints		=	8 pt
	=	4 quarts		=	4 qt
	=	128 fluid ounces		=	128 fl oz
1 quart	=	4 cups	1 qt	=	4 C
	=	2 pints		=	2 pt
	=	32 fluid ounces		=	32 fl oz
1 pint	=	2 cups	1 pt	=	2 C
	=	16 fluid ounces		=	16 fl oz
1 cup	=	8 fluid ounces	1 C	=	8 fl oz
1 tablespoon	=	3 teaspoons	1 Tbs	=	3 tsp
	=	1/2 fluid ounce		=	1/2 fl oz
1 teaspoon	=	1/6 fluid ounce	1 tsp	=	1/6 fl oz
1 square yard	=	9 square feet	1 sq yd	=	9 sq ft
			$1yd^2$	=	$9\ ft^2$
1 acre	=	43,560 square feet	1 A	=	$43,560\ ft^2$

Example B

A product label prescribes 2 pounds per acre. How much is needed for a 4800-square-foot area? Remember that one acre equals 43,560 square feet.

$4800\ ft^2 \div 43,560\ ft^2$ per acre = 0.1 acre

0.1 acre x 2 lb = 0.2 lb of product

0.2 lb x 16 oz = 3.2 oz

Example C

You need to spread a crabgrass herbicide over a 2400-square-foot area, and you purchase a 25-pound bag of the herbicide. The label states that the contents of the bag will cover 5,000 square feet. How much of the bag will be needed?

$2400 \text{ ft}^2 \div 5000 \text{ ft}^2 \text{ per bag} = 0.48 \text{ bag}$

$0.48 \text{ bag} \times 25 \text{ lb per bag} = 12 \text{ lb}$

Example D

You need to apply a grub control insecticide over 4800 square feet. The label instructions say to apply 1 gallon of water and 4 teaspoons of insecticide for each 200 square feet. How much water and how much insecticide is needed?

Water needed:

$4800 \text{ ft}^2 \div 200 \text{ ft}^2 \text{ per gal} = 24 \text{ gal}$

Insecticide needed:

24 gal x 4 tsp = 96 tsp insecticide per 24 gal water

48 teaspoons equal 1 cup, so convert the 96 tsp to cups, as follows:

96 tsp ÷ 48 tsp = 2 C insecticide per 24 gal of water

PRACTICAL INFORMATION

Legal Responsibility

• Pesticide labels are legal documents.

• If you don't read and follow label directions carefully, you are at fault—and liable—when problems result.

Rates and Application

Mix dilutions thoroughly. Choose a calm, cool day to make applications to the lawn or garden in order to avoid movement (drift) of the material onto nontarget areas. This may prevent damaging a neighbor's property and reduce your potential risk. Follow label rates, and remember: More is NOT better!

Granular Application Suggestions

• Determine the area to be treated.

• Know the amount of product needed to treat the area.

• Set your granular spreader at a low setting and walk quickly over the area. The low setting and brisk pace will necessitate covering the area twice, thus guarding against depletion of the measured product before the total area is covered.

• Apply in a uniform pattern until the required amount of the product is used up.

• Wear rubber gloves and boots to minimize exposure.

Safety Practices

- Follow all label instructions carefully.
- Wash your hands, forearms, and face with soap and water after mixing, loading, applying, or otherwise handling pesticides and fertilizers.
- Measuring cups and spoons used for pesticides and fertilizers should never be reused for other purposes.
- Clothing worn during mixing, loading, and application should be washed separate from the family laundry.
- Post a KEEP OFF sign on treated areas, outdoors, until sprays have dried.
- Clean application equipment immediately after use, prior to storage. Sprayers should be rinsed by filling with water, shaking well, and pouring the rinsate onto the actual application site. Repeat at least once, preferably twice.
- Do not apply clippings from recently treated grass as mulch around flowers beds or vegetable gardens.
- Store unused pesticides safely OUT OF REACH OF CHILDREN.

Safety Equipment and Clothing

- Read the label before mixing and applying pesticides.
- Use chemical-resistant gloves—never cotton or leather.
- Wear long pants and sturdy shoes, not sneakers or sandals.
- Wear a long-sleeved shirt.
- Wear safety goggles to protect the eyes.

Harvesting

- Read the label to determine how long you should wait after applying a pesticide before harvesting the crop for human consumption.
- Always wash treated fruits and vegetables before eating.
- Never apply pesticides to crops not specified on the label.
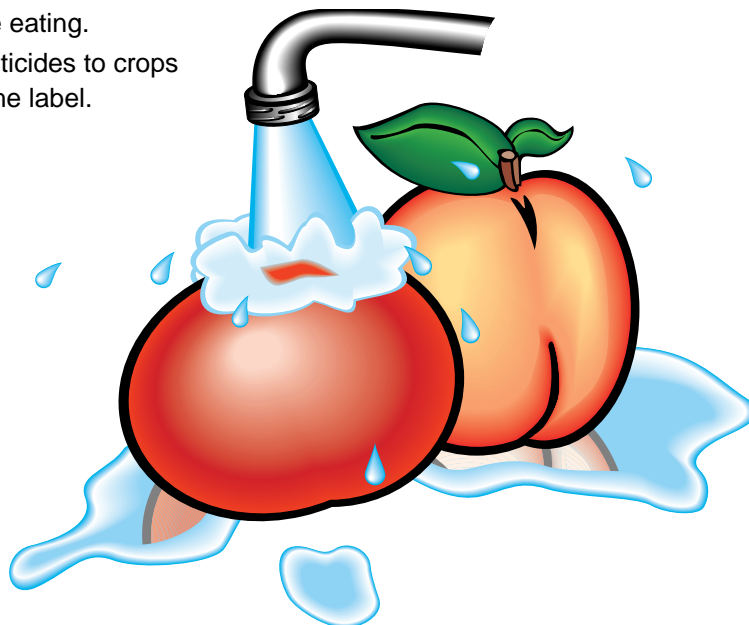
Storage, Transport, and Disposal

- Keep pesticides in original containers.
- Do not transport pesticides in the passenger space of any vehicle.
- Store pesticides away from food, children, pets, and livestock.
- Prevent accidental poisonings by securing pesticides under lock, especially when the storage area might possibly be accessed by children.
- Never pour pesticides down the drain. Use them on labeled sites. Leftover products should be disposed in conjunction with local toxics disposal, or call your solid waste district for advice.
- Prevent products from freezing.
- Deplete pesticide inventories before purchasing new or additional products.


Emergency Telephone Numbers

- Poison Control Center —————————————————

- Local Emergency Response (if not 911) ———————————

- Local Hospital ——————————————————

- Doctor ————————————————————

- Veterinarian ————————————————————

CONCLUSION

Effective pest control is based on pest identification, biology, and occurrence; the host organism; and timing. Many different pest control options are available, and it is important to note that chemicals are not always the answer. Seek advice from the Purdue University Cooperative Extension Service, through either your county Extension educator or specialists on campus, or ask questions at garden centers, hardware stores, etc.; these sources can lend valuable tips to help you solve pest problems in and around the home.
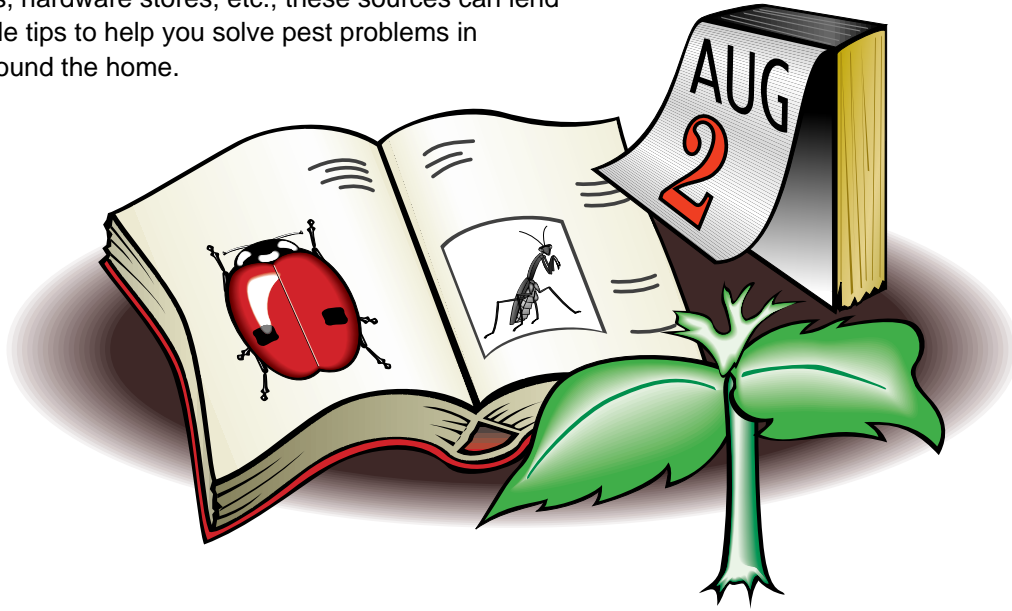
WHAT ABOUT FERTILIZER?

How Do I Know How Much Weed'N'Feed to Use on My Lawn?

Application instructions on weed'n'feed lawn products that contain a combination of herbicide and fertilizer generally tell the consumer to apply X number of pounds of the *packaged product* per 1000 square feet. To calculate the total pounds of *packaged product* you will need for the job, first determine the total square footage of the area to be treated, using the methods demonstrated on pages 4 –5 of this publication. Divide the total square footage by 1000, then multiply the result by the number of pounds of product as stated on the product label. Example:

If the label says to apply 2 lb of the *packaged product* per 1000 ft^2 of surface area and your area to be treated totals 1575 ft^2, how much product will you need to apply?

$$1575 \text{ ft}^2 \div 1000 \text{ ft}^2 = 1.575 \text{ (units of 1000 ft}^2)$$
$$1.575 \text{ ft}^2 \times 2 \text{ lb} = 3.15 \text{ lb of product}$$

How Do I Know How Much to Apply if I'm Using Straight Fertilizer?

It is important to understand how nutrients are packaged in fertilizer products. There are three prominent numbers, divided by hyphens, on every fertilizer label; these are required by law to inform the consumer of the percentage (by weight) of nitrogen, phosphorous (phosphate), and potassium (potash) in the package. For example, the numbers 24-6-12 on a fertilizer label would indicate that the product contains, by weight, 24 percent nitrogen, 6 percent phosphorous, and 12 percent potassium.

If you purchase a 25-pound bag of fertilizer that contains 24 percent nitrogen, how much of the bag will you need to use to apply a rate of 1 pound of nitrogen per 1000 square feet to your 4800-square-foot lawn?

First, figure out how much product yields 1 pound of nitrogen. In this example, the label indicates that the product contains 24 percent nitrogen.
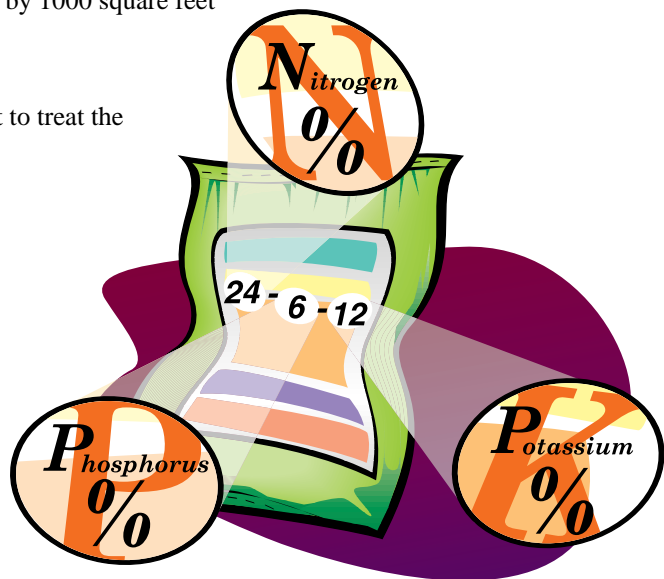
1 lb (rate of nitrogen application) ÷ 0.24 (decimal equivalent of 24%) = 4.17 lb

Therefore, 4.17 lb of product contains 1 lb of nitrogen.

Second, divide the 4800-square-foot lawn by 1000 square feet to determine the number of units needed:

4800 ft^2 ÷ 1000 ft^2 = 4.8 (units of 1000)

4.8 x 4.17 lb of product = 20 lb of product to treat the lawn at a rate of 1 lb of nitrogen per 1000 ft^2
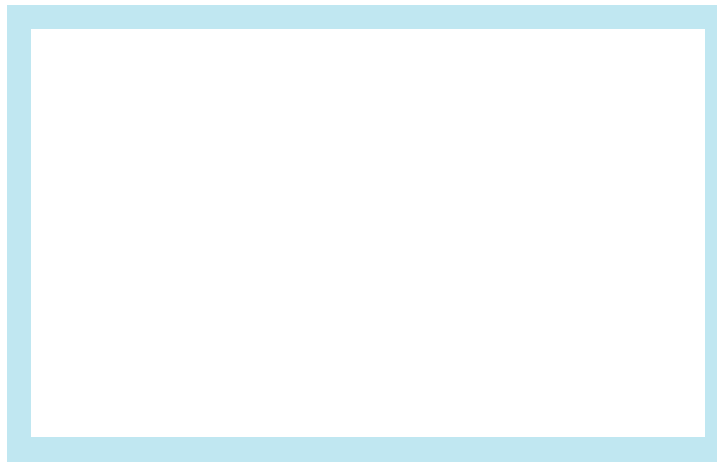
PURDUE UNIVERSITY COOPERATIVE EXTENSION SERVICE
STAFF ASSISTANCE

West Lafayette, Indiana

Purdue University's Plant and Pest Diagnostic Laboratory staff are available for a small charge to assist the homeowner in identifying pest problems and for advice on appropriate remedial procedures; call (765) 494-7071.

Statewide

Your County Extension Educator can assist you, as well. If not provided below, the telephone number can be accessed in the white pages of your directory under "(county name), county of."

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