CALIBRATING YOUR POWER SPRAYER

Calibration of pest control equipment is an often overlooked area that is of great importance. Pesticide labels tell us how much material should be applied to any given area, but many PCOs make their applications by the seat of their pants. Applying too much pesticide is dangerous and illegal, applying not enough pesticide will result in a failure to control your target pests.
The efficient and legal use of pesticides requires that you calibrate your sprayer! **Several key variables which affect calibration include:**

- Per minute output of the sprayer
- Swath of the Spray Tip nozzle
- Speed of the application device

There are a few simple tools you will need to properly calibrate your powersprayer:

1. Stopwatch A stopwatch is essential for timing travel speed and flow rates
2. Measuring tape A 100 foot measuring tape for marking off distance to be traveled and spray swath width. (The measuring tape should be both stretch and moisture resistant.)
3. Calibrated liquid container A container having the capacity of holding two quarts, calibrated for liquid ounces. This is needed for measuring spray nozzle output.
4. Scale Not needed for calibrating power sprayer, but can be used for calibrating a granular spreader. The scale would need to be capable of measuring pounds and ounces.
5. Pocket Calculator needed for making calculations in the field
6. Pressure Gauge needed for checking your rig's pressure gauge
7. Flow meter or calibrated 5 gallon pail (used with stopwatch) for calibrating your tank's sight gauge and for checking the real capacity of your tank.

1: Capacity of your Tank:

The FIRST thing you will want to do is to determine the actual capacity of your tank. You can not rely upon the manufacturers advertised size because they do not take into account: - fittings installed inside your tank

- the capacity of your pump, filters and plumbing
- the capacity of your power spray hose
- often the advertised size is only approximate

You will be checking both the actual capacity of the tank as well as calibrating the sight gauge.

1. You must make sure your vehicle is on a level surface.
2. Your tank, pump and hose must be empty.
3. Close all valves on the tank so that no water leaks or enters the pump system.
4. You will fill your tank (with clean water) using either:
    1. A bucket or other device of a known volume OR
    2. A Flow meter device attached to a hose

5. If your tank is under 10 gallons you will want to calibrate your sight gauge in one (1) gallon increments. If your tank holds 11 to 50 gallons you will want to calibrate your sight gauge for five (5) gallon increments. If your tank holds over 50 gallons you may wish to calibrate your sight gauge for 10 or 20 gallon increments.
6. Once your tank is full, and you know the capacity of your tank you will want to determine the capacity of your pump and plumbing and your hose.
    1. If possible use a shut off valve to disconnect the powerspray hose.
    2. Start pump motor and start flow.
    3. Measure the drop in the tank. (Either using the site gauge or by adding a known amount of water until the tank is full again.) This will tell you the capacity of your pump and plumbing.
    4. While the pump is running turn the valve to re-connect the powerspray hose. Your tank will drop again. Measure the additional drop in the tank. This will tell you the capacity of your hose. Now measure the length of your hose to determine the actual capacity for each 10 or 20 feet of hose. (Your hose length might change a month from now.)

2: Speed of Travel:

You want to determine your actual speed of travel. Many pest control professionals simply use the rate of 88 feet per minute. (You travel 88 feet in one minute when traveling one (1) mile per hour.) You will want to lay out a 100 foot measuring tape along a realistic application site. You will then time yourself (or have someone else time you) as you walk along this measuring tape while performing your application. You should repeat this process several times, and if possible over longer distances, and long periods of time to determine the most accurate average. See "Spray Pattern" for a suggestion for how to accurately measure your speed of travel along with your spray pattern.

3: Spray Pattern:

You will need to know what your spray pattern is to accurately figure your application rates in the field. One of the best ways to figure both your rate of travel and your application spray pattern is to mark off a 100 x 100 foot square. (1,000 square feet.) Then proceed to treat the 1,000 square foot area. The proper way to treat such an area is to time how long it takes you to treat the entire area, as well as count the number of times you walked the length of the square as you treated. You overlay the outer edges of each spray pattern so you have even coverage, and do not have gaps in between each row. For our example say you walked the width of the square 19 times and it took you 10 minutes and 45 seconds to treat the entire area.

To determine your swath or width of your spray pattern you divide the width of your area (100 feet) by the number of times you walked the width.

100 feet / 19 rows = 5 feet 3 inches.

To determine your rate of travel you will first determine the total distance traveled, and then divide by the amount of time it took you to apply the product.

100 feet x 19 rows = 1900 feet total traveled.

1900 feet / 10 minutes 45 seconds = 176.7 feet per minute or about two miles per hour.

We can also determine our flow rate to a certain extent by measuring the amount of material which you used during this exercise, and dividing by the amount of time it took us to treat the area.

For our example we used 49 gallons of material.

49 gallons / 10.75 minutes = 4.5 gallons per minute

We can also determine the amount of finished material per square yard by dividing the total amount of material used by the number of square yards.

100 square yards / 49 gallons = 2.04 gallons of finished material per square yard. (In most cases you can call this 2 gallons per square yard.)

4: Flow Rate:

You need to check your flow rate both when your sprayer nozzle is brand new, and also at regular intervals. It is absolutely essential that you regularly check your flow rate, as your nozzle wears the flow rate will change. Using the same pressure and hose length as you would during real applications, spray into a bucket for a period of one (1) minute. Measure the amount of water, and you have your flow rate.

You know have now calibrated your power sprayer. How can we use this information? Use an example to show us how this information is important. The following figures are for example only:

50 gallon tank
176 feet per minute
4.5 gallons per minute
2 gallons per square yard.

READ THE LABEL:

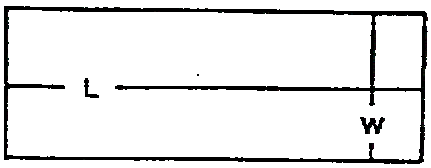
The label will tell you how much material is supposed to be put down for any given area. (Size)
How much finished material should you be applying per square yard?
How much concentrate should you be applying per square yard?
To change your rate of application, you can do one of several things:

1. Change the spray tip orifice (best option)
2. Change the speed at which you walk (poor option)
3. Lower or raise the pesticide concentration in your finished mixture (within label specifications) (poor option)

Estimating Area (Size)

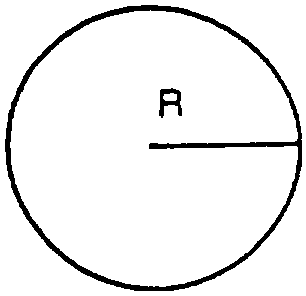
To determine how much pesticide you will need to do a job, you must measure the area to be treated. If the area is a rectangle, circle or triangle, simple formulas may be used.

RECTANGLES: The area of a rectangle is found by multiplying the length by the width.



Area = Length x Width

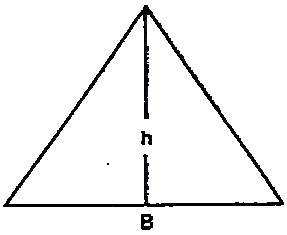
CIRCLE: The area of a circle is the radius (one- half the diameter) squared. and then multiplied by 3.14



Area = 3.14 x the radius squared

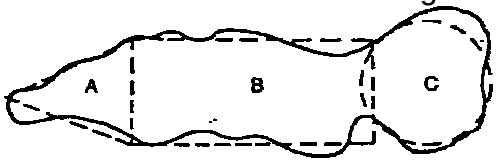
TRIANGLES: The area of a triangle is one half the base multiplied by the height

$$\text{Area} = \frac{b \times h}{2}$$



Example:

Irregularly shaped turf grass often can be reduced to one or more of these common shapes. Calculate the area of each and then add them together to obtain the total area.



Area A + B + C = Total Area

WEIGHTS & MEASUREMENTS CONVERSIONS:

WEIGHTS

- **1 ounce**=28.35 grams
- **16 ounces**=1 pound=453.59 grams
- **1 gallon water**=8.34 pounds=3.785 liters=3.78 kilograms

LENGTH

- **1 foot**=30.48 centimeters
- **3 feet**=1 yard =.9144 meter
- **16.5 feet**=1 rod=5.029 meters
- **5,280 feet** = 320 rods = 1 mile = 1.6 kilometers

LIQUID MEASUREMENTS

- **1 fluid ounce** = 2 tablespoons = 29.574 milliliters
- **16 fluid ounces** = 1 pint = 0.473 liter
- **2 pints** = 1 quart = 0.946 liter
- **8 pints** = 4 quarts = 1 gallon = 3.785 liters

AREA

- **1 square foot** = 929.03 square centimeters
- **9 square feet** = 1 square yard = 0.836 square meter
- **43,560 square ft** = 160 square rods = 1 acre = 0.405 hectacre