Calculating Spray Application Information

Knowing how your sprayer is calibrated is critical if you want to determine spray application information for a specific pesticide in a specific field. This factsheet will deal with the math required to determine specific spray application information.

In addition to sprayer output (L/ha or gal/acre) it is critical to know the area of the field you wish to spray, the amount of product required per unit area (kg/ha or L/ha) and the water capacity of your sprayer. By knowing these variables the amount of product that needs to be added to a tank full of water and the number of tank loads that will be applied to that field can be determined. This can be critical, as it allows the applicator to mix only the amount of product needed, saving dollars and the environment.

Many producers like to work in imperial units. This can create challenges as all pesticide labels are written in metric units. This exam includes a conversion sheet which will help producers work with the units they are most comfortable with. That being said, if you are working in metric or imperial units the principles for determining spray application information is the same.

Caution: When converting from imperial to metric or vice-versa, be very careful when rounding numbers as errors can cause changes to application rates and lead to either loss of pest control or potential crop damage.

When a sprayer is calculated we know the sprayer output (**Volume/Area**; ie. 200 L/ha) and the spray tank capacity (**Volume**; ie. 1000 L/tank). If we know the field size (**Area**; ie. 20 ha) we can determine the number of tanks it takes to cover a field. So, if we multiply the output of the sprayer by the field size we will get the amount of spray solution a calibrated sprayer will put on that field **(200 L/ha x 20 ha = 4000 L)**. Knowing that your sprayer can hold 1000 L of spray volume, it is easy to determine that in this example 4 tank loads will be required **(4000 L / 1000 L/tank = 4 tanks).**

Hint: Whenever doing a calculation always carry through your units and eliminate them using the factor label method. (http://demo.webassign.net/question_assets/wertzcaqs3/c0B/manual.html). (200 L/~~ha~~ x 20 ~~ha~~ = 4000 L; 4000 ~~L~~ / 1000 ~~L~~/tank = 4 tanks)

When determining how much product should be put in each tank, always read the label carefully to get the rate per hectare and any other application precautions. If the label rate is 2 kg/ha, we need to determine how many hectares each tank will cover. **(1000 ~~L~~/tank / 200 ~~L~~/ha = 5 ha/tank).** By knowing this we can multiply the rate per hectare by the number of hectares per tank. **(2 kg/~~ha~~ x 5 ~~ha~~/tank = 10 kg/tank)**

After the calculations have been made, always take a look at the numbers to make sure they make sense. For example, if the final number you get is 0.25 tanks, does it makes sense that a 20 ha field can be sprayed with 0.25 of a tank or 250 L? (1 tank (1000 L) x 0.25 tanks = 250 L)

Very rarely does it work out that the output for a field equals an even number of tank loads. For example, a certain field may take 3.75 tanks to complete. In this situation, it is important to only fill the 4th tank ¾ full and only use ¾ of the product required for the other tank loads. This is done to avoid mixing more product than required, wasting money and causing environmental damage with the disposal of the extra product.

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Common Unit Conversion Tables

Basic Metric

Length
100 centimetres (cm) = 1 metre (m)
1000 metres (m) = 1 kilometre (km)

Volume
1000 millilitres (ml) = 1 Litre (L)

Square Measures (area)
100m x 100m = 10,000 m^2 = 1 hectare (ha)

Weight
1000 grams (g) = 1 kilogram (kg)

Conversions: Metric to Imperial

Length
1 metre (m) = 3.28 feet
1 metre (m) = 1.09 yards
1 kilometre (km) = 0.62 miles

Volume
1 millilitre (ml) = 0.035 fluid ounce
1 litre (L) = 1.76 pints
1 litre (L) = 0.88 quarts
1 litre (L) = 0.22 gallon (Imp.)
1 litre (L) = 0.26 gallon (U.S.)

Area
1 hectare (ha) = 107.636 square feet
1 hectare (ha) = 2.5 acres

Weight
1 gram (g) = 0.035 ounce
1 kilogram (kg) = 2.21 pounds

Pressure
1 kilopascal (kPa) = 0.15 pounds/in^2

Speed
1 kilometre/hour (km/hr) = 0.62 mile/hour

Conversions: Imperial to Metric

Length
1 yard = 0.91 metre (m)
1 mile = 1.61 kilometre (km)

Volume
1 fluid ounce (Imp) = 28.41 ml
1 pint (Imp) = 0.57 litres (L)
1 gallon (Imp) = 4.55 litres (L)
1 gallon (US) = 3.79 L

Area
1 acre = 0.40 ha

Weight
1 ounce = 28.35 grams (g)
1 pound = 453.6 grams (g)

Pressure
1 pounds/in^2 = 6.90 kilopascal (kPa)

Metric to Imperial (Approximate)

L/ha x 0.09 = gallon/acre
L/ha x 0.36 = quarts/acre
L/ha x 0.71 = pints/acre
ml/ha x 0.015 = fluid ounces/acre

g/ha x 0.015 = ounces/acre
kg/ha x 0.89 = pounds/acre
tonnes/hectare x 0.45 = tons/acre