

Calibrating boom sprayers



Calibration is a technique to help you calculate how much water / chemical mix your sprayer puts out. This section describes how to calibrate boom sprayers with engine driven pumps.

Nozzle selection

Nozzles are the most important component of any spray machine. The type of nozzle you use depends on what you want to spray – whether it's a pest, disease or weed. The most commonly used nozzles on boom sprayers are the standard flat fan, even flat fan and hollow cone.

Standard flat fan. This is a general purpose nozzle. It produces a range of droplet sizes at low pressures (100–400 kPa) depending on individual nozzle design. It deposits more spray in the centre of the spray swath and requires overlap from adjacent nozzles for even coverage. Flat fan nozzles are normally offset 10°–20° so that the spray pattern of each is not affected by adjacent nozzles.

Even flat fan. This nozzle is used for applying herbicides in bands across plant rows or between crop rows. It produces medium to large droplets at low pressure, and deposits a uniform spray pattern across the spray swathe.

Hollow cone. This nozzle is used for low volume application of insecticides and fungicides, and sometimes for herbicides. It produces small droplets at moderate to high pressures (500–2000 kPa).

Nozzle maintenance

Make sure all nozzles on the boom are the same size and make. Nozzles are designed to work at a certain operating pressure and produce a specified output. This information is available where you buy your nozzles.

Check each nozzle regularly for wear and tear. Before every spraying job check the spray pattern from each nozzle – look for obvious striping or blockages. At regular intervals throughout the season check nozzle output against manufacturer's recommendations (see overleaf).

Worn nozzles put out more spray, affect spray width and produce larger droplets. The rate of nozzle wear depends on several factors including nozzle material, pesticides used, operating pressure and output.

Boom height

Boom height is the distance from the nozzle to the target (e.g. soil surface, crop or weed canopy). The height of the boom depends on the type, spacing and angle of the nozzles used. Boom height is normally recommended by nozzle manufacturers.

Boom height also needs to be adjusted during the season as the crop grows taller.

If the manufacturer's recommendations are not available, then a simple way to check boom height is to spray onto a level concrete or bitumen surface. Observe the spray pattern as it dries off. If the



boom is set too high, wet strips are left between the nozzles. If it is set too low wet strips are left below each nozzle. If set correctly, the spray evaporates evenly but remember to raise the boom if the round is not the target.

Calibration

To apply a specified rate of chemical to the target surface (e.g. plant, soil, pest), you need to measure the total spray output of the machine, the travel speed and the swath width. Then calculate the application rate.

Total sprayer output (L/min)

The aim here is to measure the total liquid sprayed from your machine in one minute. First, disengage the gearbox and set the engine revs (1500 is a good starting point) with the power take-off (PTO) engaged at a normal operating speed. Set the pressure at the correct level for spraying. The correct pressure is specified by the manufacturer and determined by the type of nozzles you use. All nozzles used for spraying should be left on.

1. Fill the spray tank with clean water.
2. Place a measuring jug under one nozzle. If you do not want to get wet, attach a piece of plastic hose to the nozzle and place the other end into the jug.
3. Run the sprayer for one minute at the correct pressure with all nozzles operating.
4. Measure how much water is in the jug. Compare this to the output specified by the manufacturer using the correct pressure. Nozzle output should not vary by more than 10%. If it does, the nozzle could be worn or damaged and should be replaced. All nozzles on the boom should have a similar output.
5. Repeat steps 2–4 for all nozzles.
6. Add all the jug measurements to find the total sprayer output in litres per minute.

Travel speed (km/h)

The normal speed for spraying with small boom sprayers in horticulture situations is 4–10 km/h. The slower you travel the higher the application rate. A change in ground speed of 10% results in a

10% change in application rate. Adjust your travel speed to suit ground conditions.

1. Measure out a distance of 100 metres on the ground to be sprayed and mark the start and finish positions with pegs.
2. Select the right gear and engine revs for spraying.
3. Measure how many seconds it takes to travel 100 metres with the sprayer attached and half full.
4. Calculate your travel speed by inserting the time in seconds into the following formula:

$$\text{Travel speed (km/h)} = \frac{100 \text{ (m)} \times 3.6}{\text{Time (seconds)}}$$

To calculate spray application rate (L/ha)

First, measure your swath width (in metres). For general broadcast spraying, the swath width is equal to the number of nozzles multiplied by the nozzle spacing. For band spraying the swath width is equal to the total of all the band widths.

Calculate the application rate using the following formula: Application rate (L/ha) =

$$\frac{600 \times \text{total sprayer output (L/min)}}{\text{swath width (m)} \times \text{travel speed (km/h)}}$$

For example: If your total sprayer output is 5 L/min, your speed is 10 km/h, and the swath width is 5m, your application rate is:

$$\frac{600 \times 5}{5 \times 10} = \frac{3000}{50} = 60 \text{ L/ha}$$

Benefits of calibration

By calibrating your machine you can find out your spray application rate. This information is necessary whenever you use chemicals that are specified in amounts per hectare. It also lets you work out how many spray tanks are needed for a particular job.

The spray application rate varies for different crops, different row spacings and the age, height and density of crops. This means you need to calibrate for each crop or block.

Calibration ensures that you get good coverage of the target surface and that you spray the correct amount without wastage. It saves you time and money, results in a more effective and efficient spraying job, and protects the environment.

More information

Detailed information and guidelines on how to calibrate sprayers are available from all companies producing or selling spray equipment.

*For more information on the Spray Sense series, contact Sandra Hardy,
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