information on pesticide issues

No. 4

Calibrating airblast sprayers

Calibration is a technique to help you calculate how much chemical your sprayer can put out. This allows you to spray the correct amount without wastage, saving you money and protecting the environment.

Airblast sprayers

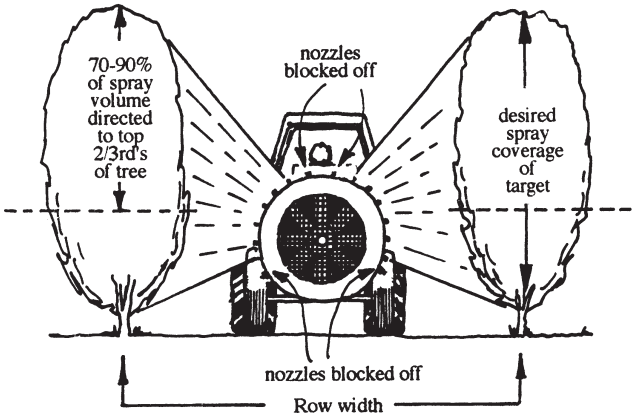
Airblast sprayers are designed to apply low to medium volumes of spray using small droplets between 30–350 microns in size. The droplets of water and chemical are carried to the target plant in an air stream generated by the fan. The airblast sprayer displaces the air in the target plant with the spray-laden air from the machine.

Most airblast sprayers have at least two fan speeds. Normally, the lower fan speed is used on smaller, less dense trees. As plant size and density increase, more air is needed so the higher fan speed is used. Airblast sprayers generate their own wind, so spraying can be undertaken under calm conditions. However, a slight breeze of 5–8 km/h may improve spray penetration.

The air stream which carries the droplets plays no part in their production. The size of droplets is controlled by the nozzles used on the machine and the operating pressure.

Nozzles

Nozzles are the most important component of any spray machine. The type of nozzle commonly used on airblast sprayers is a hollow cone which produces small droplets. The nozzles are usually arranged so that nozzles producing larger droplets are at the top and those producing smaller droplets are at the bottom. This setup is designed to apply 70% of the spray volume to the top third of the target plant (Fig. 1). In most cases nozzle size and placement are specified by the manufacturer.



Position the nozzles on your sprayer so that spray droplets cover the target plant from top to bottom. Nozzles directed into the air and onto the ground waste spray. Turn off nozzles that are not needed. Nozzles wear out quickly so check them regularly. Usually they need replacing at least once a year.

Calibration

The aim of calibration is to ensure a specified rate of chemical is applied to the target plant. To do this you need to measure the total spray output of the machine and the travel speed, and then calculate the application rate.

To calculate total sprayer output (L/min):

The aim here is to measure the total liquid sprayed from your machine in one minute. Firstly,

disengage the gearbox and set the pressure at the correct level for spraying and the PTO at 540 rpm. Leave on all the nozzles used for spraying, but turn the fan off.

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 is worn.
5. Repeat steps 2–4 for all nozzles.
6. Add all the jug measurements to find the total sprayer output in litres per minute.

To calculate travel speed (km/h):

The normal speed for spraying is between 4–8 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 so the target plant is covered with spray but the spray is not running off the leaves. If you have large, dense trees, you can reduce tractor speed to improve spray coverage and penetration.

1. Measure out a distance of 100 metres on the ground and mark the start and finish positions with pegs.
2. Select the right gear for spraying and increase engine rpm to give 540 rpm at the PTO.
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 row width. If you are spraying both sides when travelling down every row, the row width is the distance between the two rows of trees. If you are spraying only one side when travelling down every row, the row width is the distance from the centre of the row to the tree line.

Calculate the application rate using the following formula:

$$\text{Application rate (L/ha)} = \frac{600 \times \text{total sprayer output (L/min)}}{\text{row width (m)} \times \text{travel speed (km/h)}}$$

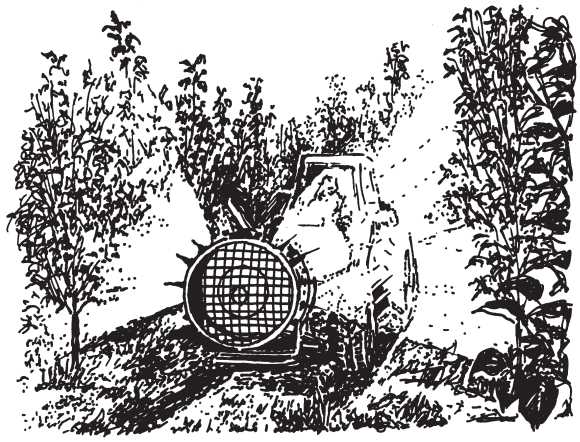
Example: If your total sprayer output is 40 L/min, your speed is 5 km/h, and the row spacing is 5 m, your application rate is:

$$\frac{600 \times 40}{5 \times 5} = \frac{24{,}000}{25} = 960 \text{ L/ha}$$

Benefits of calibration

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

The spray application rate varies for different crops, different plant spacings and the age, height and density of crops. Therefore, you need to calibrate for each crop or block. In the longterm it will save you time and money and result in a more effective and efficient spraying job.



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