

Guide to spraying Mankocide DF to manage Walnut Blight

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Scope

This guide provides a brief introduction to:

- choosing spray concentration.
- determining chemical application rate requirements for different tree sizes.
- methodology for setting spray nozzle flow rates and groundspeed.
- achieving an even coverage of your canopy.
- assessing spray coverage.

1. What concentration to use?

“Dilute” spraying

- 250g of Mankocide DF per 100 litres of water is recommended
- Equiv concentration is 350ml of Mankocide powder per 100 litres
- Spray to the point of runoff
 - Outer leaves- some dripping
 - Inner leaves- reasonably well wetted
- How many l per Ha to achieve this??– calculation & check with Tags.. Typically 1500~2500 l/Ha

Concentrate” spraying

- Low volume ~ 1/5th – 300~500 l/Ha
- High concentration 1250 g of Mankocide per 100 litres of water

What application volume per hectare for different sized trees?

- Step 1: Estimate average height of tree canopy in metres, eg. 6 m and estimate average spread of tree canopy in metres eg. 5 m then calculate the **tree profile** = height × spread = 30 m²
This is the area of canopy you would observe viewing a row end-on.
- Step 2: Calculate the summed length of rows per hectare by:
Measure the row spacing in the driven alleyway eg. 8 m
then calculate **row length per hectare** = 10,000 ÷ row spacing, eg.
10,000 ÷ 8 = 1,250 m
- Step 3: Then the **canopy volume per hectare** = tree profile area × row length per hectare eg. 30 × 1,250 = 37,500 m³
- Step 4: Finally, estimate the **spray application volume** required to wet this canopy volume evenly with spray. Work on other crops has shown that one litre of dilute spray can effectively cover between 11 and 17 cubic metres of canopy volume to the point of runoff. Divide the canopy volume per Ha by this number to get the spray volume Ha needed : eg. 37,500 ÷ 17 = 2,200 litres per hectare required.

Setting your sprayer to deliver a target application volume

To calibrate your sprayer to deliver a desired application volume, you have two practical options:

- EITHER choose how fast your sprayer will travel then calculate the total flowrate of spray required (sprayer output)
- OR choose your flowrate (ie, your spray nozzles and pressure) then calculate how fast you must travel

- To do the calculations, there are four variables to consider:
 - *The target application volume (litres per hectare), which we calculated above.*
- The width of the strip (swath width) which you are spraying in one pass (metres)
 - *This is usually the row spacing (assuming your sprayer sprays both sides at once), but if you are spraying from only one side of a sprayer work on the distance from the nozzles to the tree trunks.*
- The output flowrate from your sprayer (litres per minute)
 - *This is the total volume delivered by your sprayer pump out of all of the operating nozzles. Nozzle flow charts tell you the litres per minute output from different sized nozzles at different operating pressures. Alternatively you can measure the flowrate from each nozzle by timing how long it takes to fill a 10 litre bucket. You will find that pump capacity often limits your application volumes and/or travel speed options. As a rule of thumb it is important to keep at least 20% of your pump output volume in reserve to maintain tank agitation.*
- The forward speed of your sprayer (kilometres per hour)
 - *To measure your forward speed, time how long it takes to drive a given distance (eg. 50m). For example, if you travel 50m in 40 seconds, you are traveling at $50 \times 3.6 \div 40 = 4.5 \text{ km/hr}$. Forward speed is usually limited by the ability of the sprayer to throw the spray plume into the tops and inner parts of tree canopies. As trees get larger travel speeds will typically need to be held below 5km/hr and may need to be below 3km/hr. Coverage assessment will tell you how fast you can travel. The faster you try to go the larger your pump output needs to be to achieve your target application volume, as the following calculations show.*

4. Achieving even coverage

- Once you have worked out the sprayer output required, you need to **distribute this between the different nozzle options on the sprayer to give an even coverage through the trees**. This may seem daunting, but is actually quite easy if you follow the following rules.
- Rule 1: Park the sprayer in a typical row the distance out from the trees that it will be operated. Turn off any nozzles that will not directly target the tree canopy (allow at least one nozzle to spray the area immediately above large canopies to “rain” down onto it).
- Rule 2: Divide the available nozzles into those that target the upper half of the tree and those that target the lower half. Select nozzles to deliver 60-70% of the pump output through the upper set of nozzles into the upper half of the trees (use nozzle flow charts that tell you the output from different sized nozzles at different operating pressures, or directly measure the litres per minute from each nozzle by timing how long it takes to fill a 10 litre bucket).
- Rule 3: The further a nozzle has to throw the spray the narrower its output angle needs to be and vice versa (again nozzle flow charts should give you output angles). Typically aim for 20-30o output angles from nozzles that need to throw the spray any distance and for wider angles on nozzles closer to the canopy.

5. How to test whether you are achieving an even coverage of your canopy

- Set up water sensitive tags on poles and place them in the canopy.
- Refer the guide for interpretation details.