



## Viti-note Summary

- Calibration
- Adjusting air output
- Optimising air volume
- Optimising air speed
- Optimising air direction
- Travel speed
- Evaluating spray coverage
- Fluorescent dyes sprayed onto vines
- Water sensitive cards placed in the canopy

## Other topics in this Viti-Notes series include:

- Targeting sprays for vineyard pests and diseases
- Maintaining product performance in spray mixes
- Selecting and using spray adjuvants
- Understanding chemical 'modes of action'
- Managing chemical resistance in the vineyard
- A single rate per hectare – why it shouldn't be used
- Determining chemical rates for dilute and concentrate spraying
- Determining dilute water volumes for spraying
- Calculating chemical rates for vines

Spray equipment has to be set up so that sufficient spray solution is delivered in a manner that achieves even coverage throughout the vine canopy while minimising off-target impacts and excessive run-off.

Sprayer calibration and evaluation should be carried out before each spray round. Sprayer adjustment may be necessary when spraying different trellis types. Evaluation of spray coverage is particularly important for late season applications to bunches.

## Calibration

The speed of the tractor and rate of output from the sprayer enable calculation of the volume applied per 100 metres of vine row or per hectare. Sprayer set-up must pay attention not only to the rate per area but also to:

- different types of canopy architecture, and changes to the canopy size over the season
- the specific requirements for managing each pest or disease
- weather conditions on the day of spraying.

The three main factors to consider during sprayer set-up are:

- Vine canopy - Identify the target and any challenges to achieving effective coverage throughout the canopy
- Air characteristics - The features of the vine canopy and target determine the air characteristics – volume, speed, direction - required from the sprayer
- Application volume - The vine canopy, air characteristics and application target determine the volume of liquid and the amount of chemical needed.

## Adjusting air output

Air movement largely controls spray penetration into a canopy and evenness of chemical distribution across target surfaces.

- Air set-up considers the target, growth stage, and canopy architecture.
- Air characteristics is the right combination of air volume, direction and speed for a specific target. Air volume, air speed, air convergence/mixing and air direction may be adjustable depending on the sprayer being used.
- Air should be used to move droplets to the target - not through the canopy to the next row.
- The spray plume should penetrate and settle out within a canopy so that an occasional puffing of droplet-laden air can be seen emerging from the other side of the vine.
- If it is windy, the spray cloud should emerge from the upwind canopy, which may mean considerable movement beyond the downwind canopy.

## Optimising air volume

Sprayers usually produce too much air for the vine canopy during most of the season. To reduce air volume at the canopy, tractor speed can be increased, fan speed through the sprayer gearbox or tractor PTO can be reduced, the blade pitch can be adjusted, or air can be slowed/deflected from nozzles/spray heads.

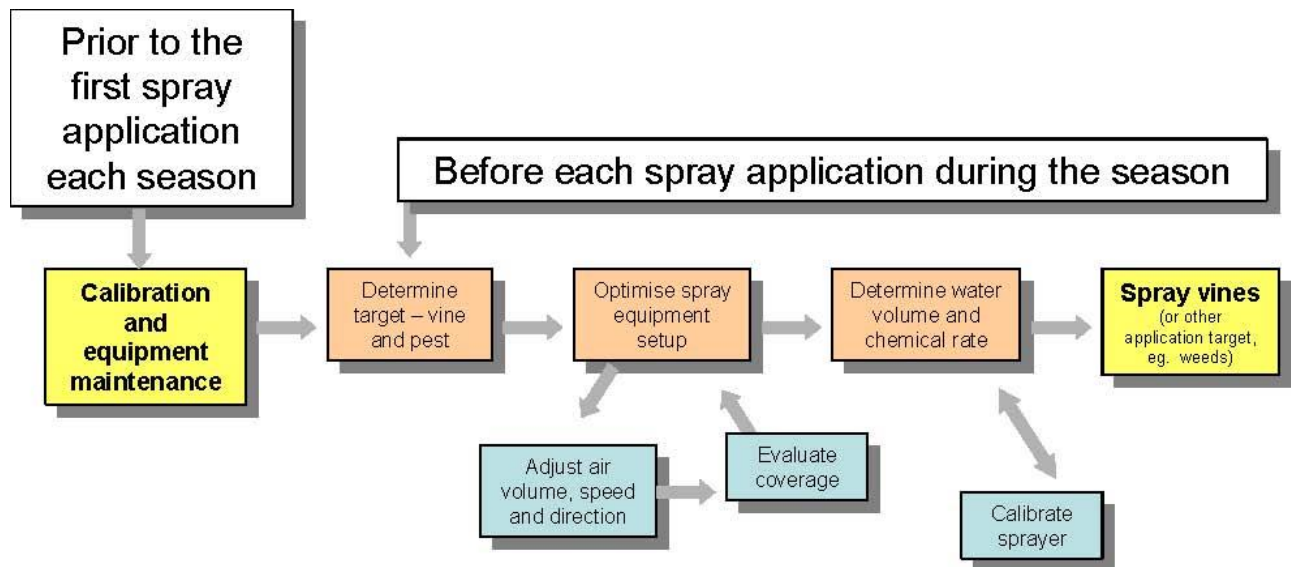


Figure 1. Spray application checklist

### Optimising air speed

Air velocity produced by some sprayers can easily push the spray plume through and beyond the canopy. High velocity air can also cause ‘shingling’ where leaves overlap and ‘wall off’ the inner canopy so that sprays do not penetrate.

To reduce air speed at the canopy:

- reduce fan speed through the sprayer gearbox or tractor PTO
- increase distance of outlet from canopy by angling nozzles back or forwards (ducted and air shear sprayers)
- enlarge the size of the air outlet (where adjustable use the largest opening or head possible to produce lower velocity, higher volume air)
- increase travel speed.

Low speed and high volume air delivery result in the best canopy penetration for axial fan sprayers only (air shear machinery works in the opposite way).

### Optimising air direction

Accurate targeting of air from fans, nozzles, heads or ducts is required to achieve even coverage and minimise off-target impacts. Accurate targeting of air flow can be achieved in a number of ways:

- using deflectors, towers or ducting which enable changes in head / nozzle angles and distance from the canopy arranging head placement usually 10 -15° back or forwards, and directed at canopy for multi-head fan sprayers - sequence of forwards, backwards, forwards etc. may be more effective when using multiple heads
- using canons with air shear equipment

- using angled air outlets or heads which lengthen the travel path of air and reduce potential for shingling of the vine canopy.

When directing air from a sprayer make sure that the spray swath covers the entire canopy and remember that converging air may, or may not, improve the evenness of deposits.

### Travel speed

Travel speed should be selected to enable good penetration and coverage of the vine canopy.

- Slower travel delivers more air and spray volume per metre of row.
- Faster travel delivers less per metre of row, therefore drive faster if air output from sprayer is too high for the vine canopy.

### Evaluating spray coverage

A number of techniques are available to test spray coverage and identify overdosing or cases where spray is missing the target. Water sensitive cards, fluorescent dyes or kaolin clay can be used to evaluate the effectiveness of sprayer adjustments and operation, and to determine appropriate spray volumes

### Fluorescent dye and kaolin clay

Fluorescent dyes provide a means to measure spray coverage and are ideal for showing the distribution of sprays inside the canopy. Assessed in shade or at night, a UV light is used to highlight the dye and show spray coverage.

Kaolin clay (sunscreen) is a fine clay powder that turns the sprayed surface white once it dries. It allows easy observation of coverage and is easy to use.



Figure 2. Kaolin clay used to evaluate spray coverage.

Whilst quite useful, coverage assessment using fluorescent dye or kaolin clay can be time-consuming and these compounds do not necessarily behave in the same way as agrochemicals. These techniques can be used as a guide as to where liquid has been deposited.

### Water sensitive cards placed in the canopy

Water sensitive cards have a yellow surface that is stained blue by water droplets. Coverage is assessed from the staining pattern. Larger droplets ( $>100\ \mu\text{m}$ ) can be clearly seen on water sensitive cards. Smaller droplets ( $< 100\ \mu\text{m}$ ) are carried in the air currents above and around the very smooth surface of a card.

Water sensitive cards can be placed in different locations in the canopy at each test run or attached at set heights to poles in fixed positions within the canopy. Using poles in this fashion is more effective as this spray target position remains fixed. Results are therefore repeatable and comparable, and any observed improvements made to coverage will be due to sprayer adjustments and not to where the cards are positioned within a canopy. The spray poles should be placed in the centre of the most 'difficult to spray' canopy in the vineyard.

Assessment of coverage can be using the SnapCard app: <http://agspsrap31.agric.wa.gov.au/snapcard/>

When using water sensitive cards it is important to remember that:

- they give a true relative indication of droplet size from different nozzles (this is not the case with fluorescent dye results).

- they under-estimate coverage of fine droplets of less than  $100\ \mu\text{m}$ .
- it is a water stain, not the dose, which is highlighted.
- drops spread and appear twice as large as they actually are.

When assessing spray coverage, look for:

- any major gaps in spray coverage within or around the vine canopy
- when run-off has occurred
- droplet size and distribution.

Regardless of which evaluation method is used, equipment adjustments, climatic conditions and vine growth stages should be recorded during sprayer set-up.

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### Further information

Contact the AWRI helpdesk on 08 8313 6600 or [helpdesk@awri.com.au](mailto:helpdesk@awri.com.au).

[www.awri.com.au](http://www.awri.com.au)

For region-specific training in pest and disease control, contact the AWRI about the Research to Practice module: 'Integrated Pest Management for changing viticultural environments'.

Other resources can also be found on the Wine Australia website: <http://research.wineaustralia.com/>

### Agrochemical information

Information about agrochemicals is published annually by the AWRI in a booklet titled *Agrochemicals registered for use in Australian viticulture*, commonly known as the 'Dog book'. Access the latest version and the app from [AWRI website](http://www.awri.com.au).



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