# viti-notes

[Effective chemical use]

Research to Practice

## Determining chemical rates for dilute and concentrate spraying

### Viti-note Summary

- Definitions
- Effective product application - coverage and dose
- Sprayer set up and spray volume adjustment for achieving coverage and dose
- What is the 'point of run-off'?
- Dilute spraying
- Concentrate spraying

### 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
- Equipment adjustment and evaluation to maximise spray coverage
- A single rate per hectare – why it shouldn't be used
- Determining dilute water volumes for spraying
- Calculating chemical rates for vines

Chemical label directions provide a 'rate per 100 litres'. The water volume needed to spray a vine canopy to the 'point of run-off' is the dilute volume and is required to calculate how much chemical to use.

### Definitions

- Dilute spraying (high volume): this is when the vine is sprayed to the point of run-off ('thoroughly wet'), using the dilute chemical rate of grams or mL/100 L from the label.
- Concentrate spraying (low volume): this is when the vine is sprayed with a water volume lower than that required for dilute spraying while applying the same amount of chemical (per hectare).
- Dilute label rate: the product concentration given on the label for dilute spraying - expressed as grams or millilitres per 100 litres of spray .
- Application rate: the amount of chemical applied per hectare or per 100 metres of vine basis. (This is not the amount of chemical deposited on the vine.) Application rate = label rate (of chemical) x water volume e.g. 200 g/100 L x 1,000 L/ha = 2 kg/ha.
- Dilute water volume: the volume of water required to 'thoroughly wet' a particular vine canopy (also referred to as 'high volume spraying').
  - Point of run-off: the situation where most of the vine canopy is covered in spray droplets so that some join together and begin to run over a leaf or berry.
    In full-sized canopies, it generally occurs on outer leaves well before inner leaves are wet. Also described as 'thoroughly wet'.
  - Coverage: percentage (%) of target surface covered by spray deposits.
  - Dose: amount of chemical deposited on a target surface, such as a leaf or berry, measured in µg/cm$^2$. (NB: this is not the amount of chemical sprayed out per hectare).
  - Lethal dose: Amount of chemical required to kill a pest or disease organism, or render it harmless.

### Effective product application - coverage and dose

Effective pest and disease control requires adequate coverage and dose. The critical steps in achieving correct spray coverage and dose are:

- Identifying the spray target: pest and/or disease and location (e.g. foliage, bunches)
- Determining the dilute water volume for the canopy being sprayed
- Selecting the appropriate spray water volume
- Calculating the chemical rates required based on the dilute volume
- Adjusting the sprayer set-up to match air output to the canopy being sprayed.

## Sprayer set up and spray volume adjustment for achieving coverage and dose

Correct timing and targeting of applications is critical to achieve effective control. The first step is identifying the pest or disease and understanding its biology, ecology and behaviour. From this information the application target (or where the spray has to be placed to kill the pest or disease) is determined, a chemical with the appropriate characteristics can be selected and an application technique can be adjusted to suit the target.

Sprayer adjustment and evaluation is carried out to maximise coverage throughout the canopy being sprayed. This involves determining the best spray droplet size and air characteristics (air volume, speed and direction) for the particular spray target. At the same time spray water volumes are adjusted to ensure good coverage to the point of run-off.

## What is the 'point of run-off'?

The term 'the point of run-off' or 'thoroughly wet' is usually defined as the point at which spray starts to run off the surface of a leaf or bunch but this point can be difficult to identify. Further complications arise because not all parts of the canopy being sprayed will have the same coverage at any one time. In most cases, outer leaves closest to the sprayer nozzles will capture more droplets than leaves in the centre of the vine. Setting up the sprayer to even out the coverage throughout the canopy is therefore important.

When droplets on foliage or bunches begin to join together with some pooling of solution at the edges, the 'point of run-off' has been reached. It is important that the sprayer has been set up to ensure even coverage of inner foliage and bunches, not only outside leaves.

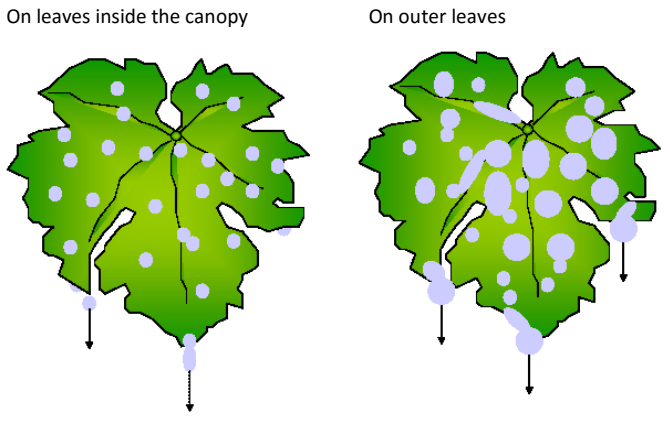


*Figure 1. Comparison of levels of coverage and wetness on leaves sprayed to the point of run-off.*

In estimating the 'point of run-off' and level of wetness in a vine canopy, the following factors should be considered:

- The 'point of run-off' should be estimated based on the evenness of canopy wetness;
- Leaves near the sprayer will usually show signs of run-off before the inner parts of the vine canopy;
- Aim to adequately cover the inner canopy before run-off begins on the outer canopy by adjusting spray equipment;
- 'Point of runoff' has not been reached if the inner canopy is mostly dry even if spray solution is dripping from outer leaves;
- Droplet sizes used for spraying will have an influence on estimating the 'point of run-off'. It is more difficult to thoroughly wet a vine canopy using fine droplets;
- When targeting bunches, the 'point of run-off' should be based on the level of wetness and coverage on berries;
- The use of water sensitive paper, kaolin clay or fluorescent dye will assist in estimating when the 'point of run-off' has been reached.

## Dilute spraying

When dilute spraying, the chemical rate (mL or grams per 100L) taken from the label is mixed in the spray tank and the foliage is sprayed to the 'point of run-off'. Spraying to this point will optimise the amount of product applied, avoid wastage and reduce possible unwanted contamination of the environment.

When dilute spraying, higher total water volumes are used during the season in comparison to concentrate spraying and a wider range of droplet sizes is produced by spray equipment. Spray volumes are also increased through the season to closely match vine canopy growth.

## Concentrate spraying

Concentrate spraying refers to the application of agrochemical using a water volume that is less than 'point of run-off'. The same amount of chemical (per hectare) is sprayed that would have otherwise been applied if dilute spraying had been used. To achieve this, the amount of agrochemical in the spray tank needs to proportionally increase as the volume of water decreases.

Spray volumes used for concentrate spraying are assessed to ensure good coverage. As the canopy grows during the season, water volumes are increased to ensure coverage is maintained as foliage area increases. Sprayer air characteristics should be matched with water volume (and droplet size) to ensure sufficient coverage at lower water volumes.

Dilute and concentrate sprays can be applied by most spray equipment used in viticulture, although the highest water volumes produced by air shear sprayers are unlikely to be sufficient for late season dilute spraying.

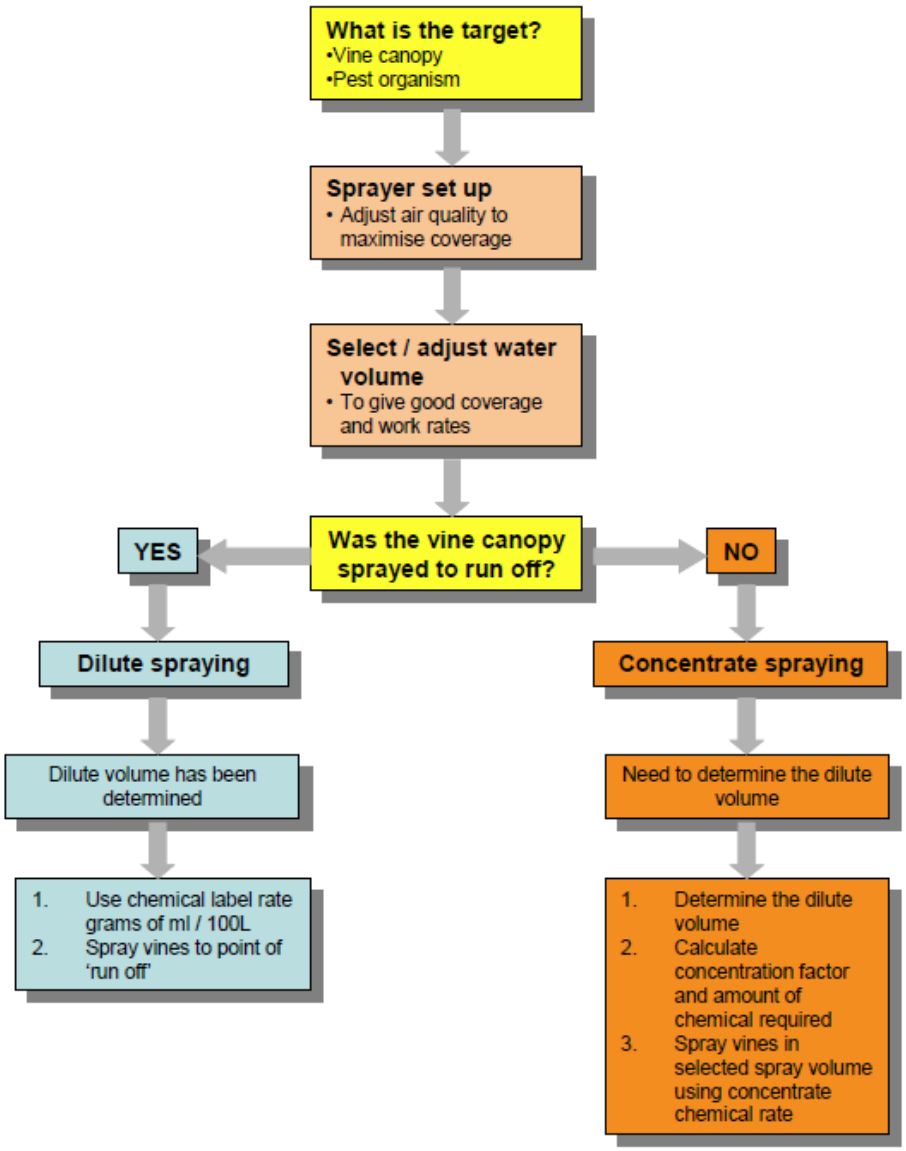


*Figure 2. Determining requirement for dilute or concentrate spraying.*

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## Further information

Contact the AWRI helpdesk on 08 8313 6600 or helpdesk@awri.com.au

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.

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