viti-notes [Effective chemical use]



Research*to***Practice**

Targeting sprays for vineyard pests and diseases

Viti-note Summary:

- Has the pest or disease been correctly identified?
- What are the biology, ecology and behaviour of the pest or disease?
- What are the grapevine characteristics that will affect chemical application?
- Improving access to the application target



Examples of changing application targets as the vine canopy develops through the season. (*Photos courtesy of Mary Retallack.*)

An important part of effective pest and disease control with chemical sprays is correctly timing the application and hitting the right target. This requires an understanding of both the biological and application target.

- The *biological target* refers to the pest that is to be controlled, for example botrytis, lightbrown apple moth or weeds.
- The application target is the place where the sprayed product must be deposited in order to work on the biological target, for example, the flowers or bunches for Botrytis control or the soil for pre-emergent herbicides.

These targets will determine the timing of product applications (to coincide with the most vulnerable or most destructive life cycle stages of the target pest), selection of the most appropriate chemical or biological product and application method, and sprayer adjustments to achieve adequate coverage and dose. The following questions should be considered to correctly determine a spray target.

Has the pest or disease been correctly identified?

Accurately identifying the pest or disease causing vine damage or yield loss will enable the correct control strategy to be implemented.

Example

 Crinkled, distorted leaves resulting from early season rust mite damage may be mistakenly attributed to cold damage, Phomopsis, bud mite, herbicides or 'restricted spring growth'.

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 chemical rates for dilute and concentrate spraying
- Determining dilute water volumes for spraying
- Calculating chemical rates for vines

Misdiagnosis of pest mites can lead to inappropriate chemical application and a reduction in predatory mite populations. The decision to apply chemicals for Phomopsis depends on correct diagnosis of symptoms on dormant canes, which can look similar to those caused by diaporthe.

What are the biology, ecology and behaviour of the pest or disease?

Understanding the behaviour and distribution of pests as well as their relationship to the environment and other organisms in the vineyard is important. This knowledge will often identify stages in a pest or disease life cycle when it is most susceptible to control measures.

Example

- Rust mites spend the winter under the bark of cordons and vine crowns, and to a very much lesser extent under the outer scales of dormant buds. In spring rust mites migrate from winter shelters to swelling buds where they lay eggs. Sprays timed to coincide with the onset of spring migration are most effective in controlling this insect pest.
- Grape bunches are most susceptible to Botrytis primary infection at flowering. Once Botrytis infection has occurred the disease remains latent until berries start ripening. Latent infection can be reduced by correctly targeted protectant sprays up until post-flowering, in combination with good cultural practices, especially those which encourage open canopies.

What are the grapevine characteristics that will affect chemical application?

There are many grapevine characteristics that affect pest and disease development and incidence, and the ability to target sprays to where the pest is located.

Example

- Dry bark of cordons, canes and spurs can be difficult to wet. Sufficient spray volume to thoroughly wet the bark is required for some pest and disease targets.
- Rapid shoot development between budburst and flowering can result in new plant tissue since chemicals were last applied not being protected even when using protectant fungicides. Accurate timing and targeting of sprays during this stage of the season is critical to ensure effective disease control.
- Leaf surfaces can have different characteristics depending on grape variety and leaf age. These can affect the way spray droplets are captured and spread. Leaves may be dusty or hairy, and harden off as they age and thus naturally repel water.

• Changes in bunch distribution, structure and size during development will impact on the spraying technique used. Spray penetration and retention in bunches after closure can be difficult due to waxy berry surfaces, tight bunches in some varieties and bunch position in dense canopies. Spraying to run-off using high spray volumes, or using adjuvants in lower spray volumes, and specifically targeting bunches, can improve deposits of the control agent applied.

Improving access to the application target

Vine canopy application targets change rapidly through the growing season.

When canopies are dense, outer leaf layers intercept much of the spray applied. Penetration is poor to the centre of the canopy which is often where fruit is located. Canopy microclimate can affect the incidence and severity of fungal disease such as powdery mildew, downy mildew and Botrytis. Disease development can be accelerated in dense canopies which are often humid and shaded so that foliage and bunches dry slowly.

Canopy management techniques to improve the exposure of the application target to the sprays being applied include:

- *Regulating water and nutrient inputs.* Practices such as regulated deficit irrigation (RDI) impose stress on the vines at strategic times in the season resulting in reduced vegetative growth and grape size, and consequently more open bunch configurations.
- Changing the trellising system or retraining vines. Foliage wires can be used to lift and hold shoots above and/or below the bunch zone. Reducing vigour by training shoots downwards is also possible in some systems.
- Using pruning methods to alter bunch configuration and distribution. Minimal pruning can result in bunches that are generally smaller and looser than those achieved with other pruning systems, enhancing penetration of sprays.
- Removing foliage from around the bunch zone. Leaf plucking or blowing can enhance bunch exposure. Normally one or two leaves are removed per shoot 2-4 weeks before veraison so that approximately 60% of fruit is visible. Lateral shoot removal can also reduce canopy density around the bunch zone in medium to high vigour vines, and summer pruning or trimming of shoots in shoot positioned canopies can reduce problems associated with shoots falling back over the bunch zone.

Understanding pest behaviour and identifying the appropriate target results in the most responsible and effective chemical application.

Acknowledgement

The Australian Wine Research Institute would like to acknowledge:

• Cooperative Research Centre for Viticulture (CRCV) and all involved in the VitiNotes series (1996 - 2006).

Further information

Innovator network factsheets

Spray application by Alison MacGregor

http://www.gwrdc.com.au/webdata/resources/files/ GWR_070_Spray_Application_Fact_Sheet_FINAL_WEB. pdf

Training

For regional specific training in pest and disease control, the AWRI is running Research to Practice: Integrated Pest Management for changing viticultural environments.

Contact

Marcel Essling: rtp@awri.com.au for more information

Agrochemical information

Agrochemicals registered for use in Australian Viticulture - updated annually.

Visit www.awri.com.au for the latest version.

Useful references

Nicholas, P., Magarey, P.A. and Wachtel, M. (Eds.) 1994 Diseases and pests, Grape Production Series 1, Hyde Park Press, Adelaide (a glove box edition of this book is also available).

For images of grapevine symptoms visit www.winetitles.com/diagnosis/index.asp

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