Viti-Notes

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Cooperative Research Centre for Viticulture

Current topics in this Effective chemical use Vitinotes series include:

Effective chemical use

1. Targeting sprays for vineyard pests and diseases

An important part of effective pest and disease control is correctly timing and targeting of the application of control products. Determining where and when a chemical should be applied 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.

Examples of changing application targets as the vine canopy develops through the season © Mary Retallack, Consultant.

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' - 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 whether the disease-causing form of the fungus is present in the vineyard, or the non-pathogenic Diaporthe form (previously called Phomopsis Type 1). Chemical control is only required for the actual Phomopsis organism which causes cane and leaf spot (previously called Phomopsis Type 2) as no obvious link has been found between Diaporthe infection and abnormal budburst or reduced grapevine productivity.

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.** For example, 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.** For example, using foliage wires 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.** For example, with minimal pruning, bunches are generally smaller and looser, enhancing penetration of sprays.

• Removing foliage from around the bunch zone. For example, leaf plucking or blowing will be effective on some vines. 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.

With the move to less persistent and more selective chemical and biological control agents, greater emphasis is needed on defining the target, and on how the chemical is applied to ensure it reaches the pest. For example, outcomes from recent research on rust mite control in Australia have clearly demonstrated that understanding the target behaviour and correct target definition can result in effective strategic spraying.

Further information

Product or service information is provided to inform the viticulture industry about available resources, and should not be interpreted as an endorsement.

A useful reference is:

• Diseases & Pests, editors, Nicholas, P., Magarey, P.A. and Wachtel, M., 1994, Grape Production Series 1, Hyde Park Press, Adelaide, (available Winetitles, 08 8223 4700, or www.winetitles.com.au).

• See also the glove box edition of the above, Field Guide to Diseases and Pests.

• Spray Application Viticulture: Research to Practice® is a training program whose delivery can be fine-tuned to suit each region. Enquiries to Peter Mansfield on (08) 8222 9255 or visit www.crcv.com.au for more information.

Visit the web site at www.crcv.com.au/viticare/vitinotes/ for updates and more Vitinote titles.

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