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Profitable Viticulture

Sulfur is still the most widely used preventative control for powdery mildew in winegrapes and forms the basis of cost-effective powdery mildew control spray programs in all forms of viticulture. The common formulation of sulfur is dry flowable wettable granules (micronised sulfurs).

Sulfur – how to get the best powdery mildew defence

By Tony Hoare

How sulfur works

Sulfur is a group Y fungicide and works in preventing powdery mildew spores from germinating. Although the exact mode of action is not known, sulfur works mainly through contact on the leaf surface with some vapour activity when temperatures are between 25-30°C. The vapour action of sulfur in the control of powdery mildew is thought to be marginal. It is droplet size, spray volume, spray interval and timing and, above all, application of the chemical to the leaf surface, that is the critical factor for effective powdery mildew control.

Sulfur is a multi-site fungicide that is ideally suited to resistance management of powdery mildew strains, which can develop resistance to single site fungicides such as some of the Dimethylation Inhibiting fungicides (DMIs).

Why spray sulfur for powdery mildew?

Powdery mildew is a slow developing disease of winegrapes that causes winery downgrades and even rejection of fruit at low levels of infection. Some wineries will reject a powdery mildew-affected block when 15% or greater infection is present on leaves.

Essentially, powdery mildew is the 'green' disease. In winegrapes, early season vegetative growth is most susceptible and natural resistance occurs once canes have lignified and bunches have reached veraison.

Powdery mildew pressure will be greater in vineyards with previous infections and 'hot spots' within a block will cause a constant pressure on the remainder of the block. I have seen unsprayed glory vines on the vineyard owner's house providing infection for the rest of the vineyard. Spores are easily spread by wind and will travel between vineyards in prevailing winds.

The ideal climate for powdery mildew infection is temperatures regularly around 20-30°C and relative humidity of 40-85%. It also prefers dark conditions as ultra violet sunlight will provide some deterrent to exposed parts of the plant. The underside of leaves and bunches will not benefit from sunlight exposure and are usually more vulnerable to powdery mildew infection.

Sulfur is relatively cheap per hectare as a control of the disease and is very effective when applied correctly. It has a low

mammalian toxicity, making it one of the 'safer' chemicals when considering occupational health and safety.

Spray coverage

When applied to winegrape leaves, the majority of sulfur binds to the surface, some is absorbed for nutritional needs of the plant, some is lost to vaporisation and missing the target and some is washed off. On average, 50% of applied sulfur will be situated on the leaf where it can provide protection from powdery mildew.

The effectiveness of sulfur as a powdery mildew control is directly related to spray coverage and timing of sprays.

Spray timing

The period of budburst to veraison is critical for powdery mildew control. Sulfur works best as a preventative control for powdery mildew and applications are best made beginning at 3-5 leaf (EL 12) when there is enough canopy to be able to target the spray.

Early sprays with sulfur are required to coat the new foliage, and provide the chemical barrier to powdery mildew spores germination. The interval between sprays is really dependent on the rate of growth of the vines. All varieties are susceptible to powdery mildew with some being more susceptible such as Chardonnay. Poorly ventilated, low light canopies, high vigour varieties and smooth leaves more than hairy leaves are also more prone to powdery mildew infection.

The intervals between applications of sulfur depend on the rate of vine growth, the previous powdery mildew status of the vineyard and incidence of rainfall. Spray intervals of 10-14 days generally provide adequate coverage for most varieties in most conditions, with shorter intervals recommended for high-pressure powdery mildew vineyard conditions and seasons where rainfall washes off the sulfur. It can be sprayed until 30 days prior to harvest, although the efficacy of powdery mildew control is lessened with more advanced canopies and the risk of phytotoxicity is increased with hotter weather. Powdery mildew experts Dr Bob Emmett and Peter Magarey advise that powdery mildew control can be achieved over two to three consecutive seasons.

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Phytotoxicity

Sulfur burn can be an issue where sulfur pools at the base of leaves and bunches and concentrates. This situation is made worse by high humidity, which slows the drying of sulfur droplets, which can then run and concentrate on the leaf margins. When followed by hot weather this can cause the leaf to burn. Small is best in terms of droplet size and the addition of additives for 'sticking' sulfur drops is important when spraying in high humidity conditions to prevent leaf and bunch damage from phytotoxicity. Spraying test paper placed in and around the canopy is a good way to assess spray coverage and droplet size.

Rates of sulfur

Manufacturers recommend a range of sulfur rates for powdery mildew control. The label rate range is between 200-600g/100L. The rate recommendations are directly proportional to powdery mildew disease pressure. However, it is important to note that spray coverage is critical and powdery mildew protection can be achieved at the lower rate with less harm to beneficial insects.

Beneficial insects

Sulfur is also registered for use in viticulture as a control for bud-mites and rust-mites. The recommendations of Dr Martina Bernard are to only spray sulfur if symptoms of mite damage

have been detected in the vineyard the previous season. If no damage has occurred, then a spray with sulfur is wasted and will only cause damage to the beneficial insect population and a possible outbreak of bud-mite or rust-mite the following season. Rates of sulfur are also critical with the most susceptible known beneficial insect *Eusieus victoriensis* having a tolerance of sulfur at 100g/100L. The insect will survive at higher rates but with a lower population directly related to increasing rates of sulfur.

Sulfur is still the foundation of cost-effective powdery mildew control. When combined with regular vineyard monitoring, a well-calibrated spray unit, adequate spray coverage, and appropriate spray intervals between budbust and veraison in combination with DMI fungicides, should provide confidence that a crop is protected from this silent creeper disease.

References

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