



Monitoring for Downy Mildew

Viti-note Summary:

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- **When to monitor**
- **How to monitor vines**
- **How to monitor weather conditions**
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Why monitor?

Downy mildew has very specific moisture and temperature requirements, and the organism is able to continue its infection cycle throughout the season whenever suitable conditions occur.

Failure to prevent infections, or inadequate control, can result in severe crop losses due to premature leaf fall and infection of flowers and bunches. In severe circumstances, 100% of inflorescences or bunches may be lost to infection.

With careful monitoring of weather conditions, prediction of the likelihood of disease occurrence can be accurate and appropriate pre-infection (protectant) or post-infection (eradicator) sprays can be applied. Monitoring can also ensure that any chemicals applied are targeted more effectively at vulnerable stages of disease development. Subsequent monitoring for oil-spots confirms if predictions were accurate and if spray coverage was effective.

If no downy mildew is detected by monitoring, the need for spraying or other actions can be reduced or eliminated.

What to look for

Symptoms of infection by downy mildew include:

- Characteristic yellowish oily spots appear on leaves. These can merge to cover the whole leaf. After suitable conditions, clumps of white downy spore bodies grow from the undersides of leaves. Late season infection of older leaves can appear 'mottled'. Severely infected leaves may fall.
- Oily brown patches spread along infected shoots, stems and tendrils. Leaves on these shoots can die and fall, and shoots may break.
- Infected flowers, bunches and berries turn brown and oily in appearance, and produce the downy spore masses. Berries become resistant to infection around 5–6 mm (pea size), however those infected when young can shrivel and fall. Mature berries

Other topics in this Viti-Notes series include:

- Characteristics of downy mildew
- Symptoms of downy mildew
- Monitoring for downy mildew
- Management for downy mildew



Figure 1 Characteristic oil spot symptom of downy mildew. Image courtesy of P.R. Dry.

can also shrivel and fall if berry or bunch stems become infected.

Where to monitor

Focus monitoring efforts on:

- Parts of the vineyard with a history of the disease which might already be harbouring oospores in infected vineyard floor materials.
- Blocks where susceptible varieties are planted.
- Parts of the vineyard with increased humidity and leaf wetness such as sheltered rows, within dense canopies or sites where overhead irrigation sprinklers overlap.
- Closed vine canopies which shelter the organism and reduce spray penetration.
- Areas of the vineyard closest to or downwind of sources of infection (eg unsprayed blocks, vines on pergolas).

After a primary infection event, concentrate on lower leaves of vines in areas where infection is likely. Oilspots may be as infrequent as one per 50 m of vine row. If any are found (these sites should be marked with flagging tape) further monitoring should focus within about a 50 m radius of the tagged vines.

When to monitor

Sampling in the vineyard should occur when weather reports or disease prediction models indicate potential for conditions which may result in a new generation of oil-spots:

- Vines with oil-spots should be tagged and these sites checked again after suitable warm, wet nights to see if the downy spore symptoms appear, or if the disease has been controlled by any post-infection sprays.
- Vineyards should be monitored every 1–2 weeks disease conditions (10:10:24) have occurred.

How to monitor vines

Inspect both sides of 200–300 vines, briefly examining leaves and later bunches.

- Check outer leaves as well as inside the canopy where less light penetrates.
- Focus on the canopy near the ground in low lying areas.
- Use a hand lens to check suspect patches on leaves for downy mildew growth (resting spores will not be visible).
- Orientate leaves at an angle to the sun to make downy mildew easier to identify.
- Look for oily yellow spots which might or might not have down on the undersurface.
- Mark infection sites to allow later assessments of disease spread and the effectiveness of control treatments

It is a good idea to train everyone working in the vineyard to recognise the symptoms of a range of pests and diseases, even if you have dedicated staff primarily responsible for monitoring. Remember to keep records of all monitoring results.

A simple 'desk-top' test for downy mildew can be conducted to verify monitoring results:

- Collect suspect leaves and bunches in the afternoon or evening and seal in a lightly moistened plastic bag (not wet, 3–5 drops of water per cm² of bag surface is enough)
- Incubate in the dark at 130C or higher (20–250C is best).

If infection is present, fresh white down will be obvious next morning. For leaves, this will be mainly on the lower surface of the oil spots. Note: Berries greater than 5 mm will not produce spores, but the downy spore structures will be visible on any infected bunch and berry stems.

How to monitor weather conditions

Monitoring and processing of information related to weather conditions, such as 10:10:24, can be done in a number of ways:

- using a rain gauge and maximum-minimum thermometer. These usually need to be reset each day and can only provide a guide to the suitability of conditions for disease development
- automatically, using data collected by a computerised weather station (AWS) which monitors temperature, rainfall, leaf wetness and humidity (some automatic weather stations also have basic disease prediction capabilities)
- by inputting AWS data into disease modelling programs.

Modelling disease development

Disease prediction models are designed to give vineyard managers and monitoring staff a tool with which they can indicate higher risk periods for disease development and spread, to allow more targeted management programs to be put in place in the vineyard.

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Further information

Innovator network factsheets

Managing Downy Mildew

<http://www.gwrdc.com.au/webdata/resources/files/DownyMildewFactShee.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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