



Scheduling Regulated Deficit Irrigation

Other topics in this Viti-Notes series include:

- An introduction to Regulated Deficit Irrigation
- Limitations of Regulated Deficit Irrigation
- Varietal responses to Regulated Deficit Irrigation

Creation of a water deficit between fruit set and veraison to gain the benefits of Regulated Deficit Irrigation (RDI) becomes easier to achieve with experience. This is because record-keeping, close observation of vines and soil moisture monitoring help build an understanding of when it is best to schedule or withhold irrigation.

Planning should begin before the irrigation season starts. Consider:

- The moisture status of the soil (which will be influenced by the amount of winter and spring rain);
- Root volume, which indicates the depth of soil that will need to be dried out. While the term "dried out" is used to describe the status reached before veraison, the soil is not totally dry even at wilting point. There will be some water in the soil but it will not be available for use by the vine because it is held too tightly by the soil particles. It is also important to note that the entire root system does not need to be at this stage before shoots stop growing.
- The probable time needed to dry soil out to a particular depth. This will be influenced by the amount of water in the root zone prior to starting RDI, and the infiltration rate plus water holding capacity of the soil type in question. Placement of soil moisture monitoring probes at different depths will indicate not only the available moisture but also the rate of wetting or drying
- The desired grape production results (particularly grape characteristics important to wine quality).

This 'grape product outcome' can be regarded as the management goal. In broad terms the way RDI can help achieve this goal is by slowing vegetative growth and in some situations controlling berry size, whereas supplying grapevines with a generous water supply throughout the season can encourage excessive canopy development and often very high yields of grapes which may not have the best possible characteristics.

Example using RDI to achieve specific outcomes

Below is an example of vineyard planning and implementation aimed at producing quite specific outcomes from RDI.

Planning

In this example the goal is a medium price quality grade to be achieved through reduced berry size of Shiraz and canopy control that provides an ideal balance of fruit and vegetative (shoot and leaf) components. Below is the statement of aims and proposed activities.

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VARIETY	GOAL	QUALITY SPECS	VINE	SOIL	ACTIVITY
SHIRAZ	<ul style="list-style-type: none"> • Reduce berry size improving fruit and wine quality 	<ul style="list-style-type: none"> • Characteristics of grapes that result in a bottle price of \$15 	<ul style="list-style-type: none"> • Shoot length 1.5 - 2m • No growth or minimal lateral growth during the RDI period 	<ul style="list-style-type: none"> • Sandy loam over medium clay • 40mm of Readily Available Water (RAW) 	<ul style="list-style-type: none"> • Apply deficit post set • Control shoot growth

Implementation

Determining the level of deficit required during the RDI period can be assisted by personal experience and, particularly if just starting out, by a viticultural consultant familiar with local soil types. In addition to monitoring technology, visual observation of stress in vines is important. One technique for testing the impact of a water deficit is to close off or adjust some emitters and compare effects of different levels of severity of moisture deprivation.

The critical thing level to find in applying RDI is that point at which the vine has significantly slowed growth or is no longer developing shoots (observed by measuring change in internode lengths), but does not impose too much stress on vines. Some growers develop their own set of visual indicators for finding this point. For example, one Riverland grower maintains a deficit until the last three tendrils are left on a shoot. Soil moisture levels, measured by monitoring probes, are then recorded and these values used to indicate the 'refill points' - the critical soil moisture level at which water is reapplied to the vines - during the deficit period.

This sort of method works very well in vineyards where soils and vines respond to water application rapidly. In heavier soils the response time of the vine to applied water may be longer resulting in the vine experiencing more deficit than required.

In these circumstances where soil moisture monitoring equipment measuring soil tension is used, 200kPa is often a good starting point to start or stop?. The soil moisture value at which water is applied can then be changed if necessary as experience with the deficit system increases. Whatever schedule is implemented in a vineyard, plans need to be flexible to take into account seasonal variations such as unexpected rainfall events, or higher than average water use by vines due to high temperatures or extreme windiness.

Monitoring

Keep records of irrigation schedules, vine responses to different irrigation amounts (photographs are an excellent record of vine responses), water use, yields and quality.

Assessing the outcome

An evaluation at the end of the season enables more successful planning for the following irrigation year. Information from wineries regarding fruit quality and end use, as well as from irrigation and vine response records will be valuable.

The statement of aims and proposed activities prepared at the beginning of the season or RDI period should be compared to a statement of results and achievements at the end of the season.

VARIETY	GOAL	QUALITY SPECS	VINE	SOIL	ACTIVITY
SHIRAZ	<ul style="list-style-type: none"> • Reduced berry size • improved fruit and wine quality 	<ul style="list-style-type: none"> • Grew 8 t/ha, a grade relating to wine retailing at \$15 	<ul style="list-style-type: none"> • Shoot length averaged 1.5m • Minimal lateral growth 	<ul style="list-style-type: none"> • Sandy loam over medium clay • 20mm of Readily Available Water (RAW) 	<ul style="list-style-type: none"> • Goal achieved

Further information

Water Management for Grapevine Production: Research to Practice¹ 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.

Numerous articles about Regulated Deficit Irrigation and other water management techniques have been published in various issues of The Australian and New Zealand Grapegrower and Winemaker. Visit www.grapeandwine.com.au/ for details.

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

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