viti-notes

[irrigation]

Research to Practice

Limitations of Regulated Deficit Irrigation

Viti-note Summary:

- Climatic conditions
- Different soil types

Ability to implement a deficit irrigation strategy is influenced by climate and soil type. Most difficulties with Regulated Deficit Irrigation (RDI) occur where soil is difficult to dry out, either because it is a type which retains moisture or it is in a region where late spring rainfall keeps it moist. Soil must dry out enough to induce a deficit response at the required growth stage and take in moisture at an adequate rate to relieve the deficit when irrigation is resumed. These are influenced by the rates of infiltration and evapotranspiration, and the total water available to vine roots. The most significant limitations to a successful RDI program are presented below.

Climatic conditions

High winter and spring rainfall and rainfall events through the growing season make it difficult to dry the soil and produce a deficit response in the vines. In regions that start the growing season with full soil moisture profiles it may be difficult to sufficiently dry the subsoil to get to a deficit situation by fruit set, especially if spring rainfall is plentiful. A mown sward in mid rows to utilise excess water may help in these situations although care needs to be taken to ensure enough soil moisture is available to vines, and irrigation amounts are not increased as a result. Where rainfall patterns do not make RDI possible there may still be scope through careful timing of irrigation to exercise some control over canopy vigour.

High early summer temperatures can mean special care needs to be exercised when applying a deficit program. Experience in vineyards in hot climates indicates that RDI can be applied successfully when vines are irrigated sufficiently before flowering, particularly where soils and irrigation systems allow quick infiltration of water immediately at the conclusion of the RDI period.

Different soil types

Lighter soil types (sands, sandy loams) are the easiest soils with which to implement deficit irrigation practices as the soil moisture levels are able to be controlled quite easily (depending on climate of course). These soils generally dry out relatively quickly and also re-wet quickly. Control of soil moisture in these situations can be very precise, except where the soil profile and root extension is very deep.

Clays are more difficult to manage but with practice and experience can successfully deliver desired responses in the vine. These soils generally take longer to dry out at the beginning of the season and are then more difficult to re-wet once dry. Careful management of moisture levels in the active root zone ensures that adequate soil moisture is available throughout the growing season.

It is extremely difficult to manage RDI programs in heavy soils such as black cracking clays as they store large amounts of water and crack when they do dry out, making re-wetting a slow process. Proceed with caution if applying deficit irrigation on these soil types. Other practices (such as mulching) may need to be implemented to successfully manage the system. It is advisable in these situations that a very small section of the vineyard is trialled with the deficit practice until confidence in management is gained.

Other topics in this Viti-Notes series include:

- How to start irrigating with less water
- An introduction to Regulated Deficit Irrigation
- *Limitations of Regulated Deficit Irrigation*
- Scheduling Regulated Deficit Irrigation
- Varietal responses to Regulated Deficit Irrigation

Duplex soils (sandy loams or loams over clay subsoils) present specific challenges. Generally the top soil acts like the lighter soils described above and the sub soil like the heavier soils, with the added difficulty of transient water tables forming over the clay subsoil if it is impermeable, or if the application rate is too high. Management of duplex soils depends on knowing vine root distribution and gaining experience with the drying and wetting characteristics of the soil.

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).
- Associate Professor Peter Dry (Viticulture consultant, The Australian Wine Research Institute) in the preparation of this document.

Further information

Nicholas, P. 2004. Soil, irrigation and nutrition. Adelaide: Winetitles.

Articles about Regulated Deficit Irrigation and other water management techniques are available to the Australian wine industry through the Australian Wine Research Institute library. Visit http://www.awri.com.au/contact/ for details.

For information on drought management, go to Innovator Network Resources at www.gwrdc.com.au.

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

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