

# WATER MANAGEMENT

## HOW SHOULD I MANAGE WATER ON MY VINEYARD?

### CHECKLIST OF QUESTIONS TO ANSWER:

#### WATER QUALITY

##### 1. What is the source and quality of my water?

- Collect a water sample and have it analyzed by a reputable lab for pH, EC, carbonate/bicarbonate, sodium, calcium, magnesium, potassium, nitrate nitrogen and sulfur.
- Water testing is especially important when your irrigation source comes from a well.

##### 2. Why should I test my water?

- To understand what, if any, plant nutrient additions are supplied by your water source.
- If there is measurable nitrate or sulfur, nutrient management will need to be adjusted accordingly.
- To determine if the water supply you are using could have a long-term impact on the soil chemistry and quality of your vineyard.
- With time, soil chemical properties increasingly reflect the chemistry of the irrigation water.
- If your water supply contains a high water pH and high carbonate/bicarbonate, water treatment is recommended. It is much easier to treat problem water than fix a soil problem that develops from using poor quality water.

##### 3. How often should I test my water?

- Vineyards irrigated with well water: test water at least every five years.
- If you are close to the end of the run in an irrigation district: test at least every five years.
- If you are treating irrigation water, monitor the water quality at the vineyard periodically throughout treatment to assure that the treatment is effective.

#### WATER MANAGEMENT

##### 1. How much water should I apply and when should I apply it?

(Note: see Soil Surface Management for cover crop irrigation needs.)

##### FOR JUICE GRAPES:

- Irrigation scheduling should be based on soil moisture monitoring, not on a calendar basis. See Ley et al. (1994) for techniques available for soil moisture monitoring.
- Maintain soil moisture at levels that support the canopy and crop development and quality.
- Excessive soil moisture early in the season and during bloom likely contributes to chlorosis and should be avoided.
- Insufficient soil moisture post-bloom can lead to blackleaf and potential loss of productivity and is not recommended.

##### FOR WINE GRAPES:

- Irrigation scheduling should be based on soil moisture monitoring, not on a calendar basis. See Ley et al. (1994) for techniques available for soil moisture monitoring.
- There is a perceived relationship between water supply, plant canopy, crop yield and wine quality. This must be considered when developing irrigation water management practices.
- Although wine grapes require far less water than juice grapes, in the arid regions of Washington State, wine grapes do require irrigation water.
- Research in California has demonstrated that moderate water stress, particularly between bloom and veraison, has significant, positive impacts on wine quality.



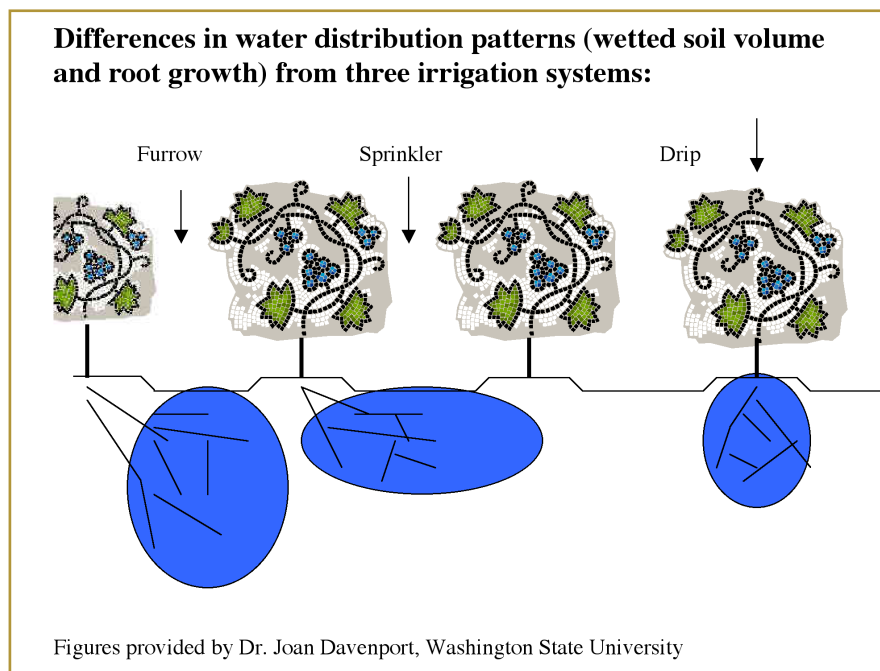
- Recognize that root nutrient uptake from the soil is completely dependent on having some soil moisture.
- Over-dry situations may induce nutrient stress and will adversely affect root growth.
- To reduce the risk of winter injury, supply a sufficient quantity of irrigation water post-harvest and as near to dormancy as water supply allows to fill the root zone but not beyond.
- Note: fertilizer additions made when implementing a limited water supply program like regulated deficit irrigation (RDI) may result in nitrogen distribution to areas beyond the active root zone and may be unavailable to the plant.

## 2. Is monitoring soil and plant moisture necessary?

- A system for monitoring soil moisture is imperative to prevent overstressing the plant. Systems can monitor: the amount of water available to the plant and the plant water use; or the plant water stress level.
- Soil moisture monitoring equipment in low water supply vineyards, such as regulated deficit irrigation (RDI), may have limited reliability in predicting irrigation scheduling needs. Monitor crop canopy for signs of water stress and irrigate when plant stress has reached desirable levels.

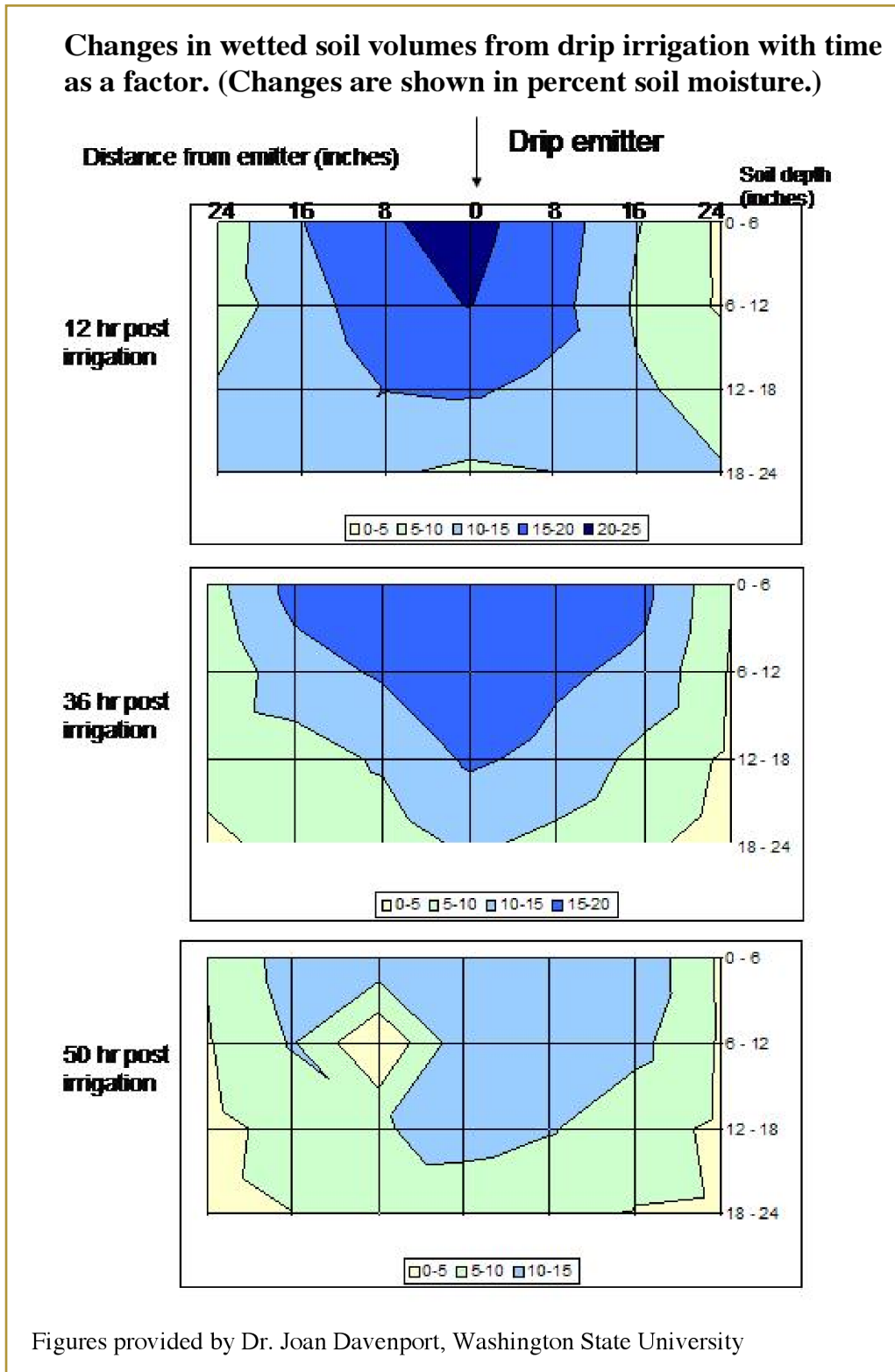
## 3. What are specific considerations for operating my irrigation system?

- Irrigation system choices include drip, sprinkler, or furrow irrigation methods.



#### 4. Is your vineyard drip irrigated?

- Drip irrigation systems wet a small volume of soil under each drip emitter. The size and shape of the wetted volume is soil texture dependent and expands and contracts between irrigation events. Frequency, duration, and application rates determine the wetted volume.



- Soil directly below the drip emitter is prone to surface sealing over time. Poor quality water increases the speed with which the surface will seal.
- Drip irrigation systems do have maintenance requirements depending on water quality and type of emitters. Acid should be used to clean the lines and emitters when water has a high pH.
- High salt or low pH zones commonly develop in drip irrigated systems where fertilizer is applied through the irrigation system. This occurs because fertilizers are salts and adding them to the irrigation water changes the water quality. In addition, the length of time of application can move the available nutrient zone in or out (see wetted volume diagram) and may strand nutrients in a zone of limited availability when soils are dry.

### **5. Is your vineyard sprinkler irrigated?**

- The sprinkler system should be designed to ensure a uniform pattern of water distribution and apply water at or below the soil infiltration rate.
- Choice of spacing and nozzles should be customized to your vineyard.
- Soil surface sealing occurs naturally in sprinkler irrigated systems. This occurs most rapidly with poor quality water. Manage your soil surface to reduce loss of water infiltration due to surface sealing.

### **6. Is your vineyard furrow irrigated?**

- This system applies the highest amount of water at each irrigation event and water use efficiency is low. Furrow applications are less frequent in nature due to the high volume of water applied.
- Application rates vary across the water run due to the inherent nature of this system, with the least amount of water mid-run.
- Proper management practices should be followed to minimize soil erosion and ensure that water quality meets return flow standards. This may include the use of polyacrylimide (PAM) and other best management practices (see Canessa and Hermanson, 1994, Chapter 4).
- Poor water quality may lead to reduced water infiltration.

## **CHECKLIST: BUILDING YOUR WATER MANAGEMENT TOOLBOX**

- What type of irrigation system do I have or am I planning?
- If I am working with an existing irrigation system, have I tested it for uniformity?
- Have I tested the quality of my water?
- Have I developed a database of changes in water quality over time?
- Have I developed a strategy for managing any water quality problems?
- Have I referenced the information in the Soil Management and Soil Surface Management to evaluate how my water management may interact with and affect soil properties?
- Have I chosen a technique to monitor soil or plant moisture status?
- Have I evaluated my water management plan relative to my yield, quality and canopy management goals?



## RESOURCES:

Burt, C., K. O'Connor, and T. Ruehr. 1995. Fertigation. Irrigation Training and Research Center, California Polytechnic State University, San Luis Obispo, California.

Canessa, P., and R. E. Hermanson. 1994. Irrigation management practices to protect ground water and surface water quality: State of Washington. Washington State University, Pullman, Washington.

Hillel, D. 1987. The efficient use of water in irrigation. The World Bank, Washington, D.C.

Kriedemann, P. E., and I. Goodwin. 2003. Regulated deficit irrigation and partial root zone drying: An overview of principles and applications. Land and Water Australia, Canberra, Australia.  
<http://www.lwa.gov.au/about.asp?search=I98>

Ley, T.W., R. G. Stevens, R. R. Topielec, and W. H. Neibling. 1994. Soil water monitoring and measurement. PNW 475.

U.S. Department of Agriculture's Salinity Laboratory  
<http://www.usssl.ars.usda.gov/>

Washington Irrigation Scheduling Expert (WISE)  
<http://www.prosser.wsu.edu/>

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