

SOIL MANAGEMENT

HOW SHOULD I MANAGE MY SOIL?

CHECKLIST OF QUESTIONS TO ANSWER:

NEW VINEYARD

1. Are any site modifications needed?

To determine if ripping is required, answer the following questions:

- What are the root zone requirements of the variety or varieties to be planted?
- Are there any root growth restrictive zones or compacted layers?
- If yes, ripping should be considered.
- If no, ripping likely is not needed.

2. How variable is the site?

- If very uniform, ripping is not likely needed.
- If there is a lot of variability in soil depth or presence of restrictive zones, rip the entire vineyard to improve uniformity.

3. Is land leveling needed?

- Minimize or avoid this practice. Grapes generally tolerate slopes and land leveling frequently exposes less desirable soil.

4. How do I determine if I need variable rate soil amendment applications?

- An electromagnetic conductivity (EMC) survey is easily conducted on bare soil for a new vineyard. Two types of EMC surveys are commercially available, either using VERIS or EM38 equipment. Surveys can show areas of variability in the field and can be used to decide where soil samples should be collected.
- Collect soil samples for soil pH analysis. Other things to measure are electrical conductivity (EC) and nutrients.

5. What soil amendments (including plant nutrients) should I apply?

- Apply lime and/or sulfur based on field soil testing using variable rate fertilizer application technology to improve uniformity of soil pH.
- Prior to planting a new vineyard, phosphorus, potassium, zinc and plant-available sulfur (sulfate form) should be applied based on field soil testing.

6. What if this is an organic vineyard?

- For organic grape production, a base level of organic matter should be added and incorporated before planting.

EXISTING VINEYARD

1. How should I manage the soil of an existing vineyard?

- Is irrigation water infiltration adequate or is there runoff?
- If there is runoff, consider tillage or shallow ripping between rows, planting cover crops, or applying less water.
- Regular tilling of the soil to reduce weed pressure is a common practice when producing organic grapes but it will increase the risk of deep soil compaction and can encourage erosion and mite problems. Avoid tillage when possible; vary your method and depth of tillage to reduce compaction risk.

2. Is water quality changing your soil chemical properties?

- Monitor soil pH and EC yearly, especially in vineyards with variability. In drip systems, monitor drip zones periodically (every 4 - 5 years).



3. Are nutrient amendments needed for canopy and fruit quality management?

•HOW TO ASSESS NUTRIENT NEEDS:

- NITROGEN - Sample petioles for nitrate at bloom. (Note: values are very dependent on irrigation water timing; be consistent and sample at the same time each year.)
Sample leaf blades at veraison for total N.
- OTHER NUTRIENTS – Sample leaf blades at veraison.
If leaf tissue is low in one or more nutrients, collect a soil sample to determine if the limitation is soil or plant driven.
- VISUALLY OBSERVE THE CANOPY FOR VIGOR AND COLOR.
N can be low in tissue in a high vigor situation due to excess growth spreading the N across a large tissue mass.

•OTHER NUTRIENT CONSIDERATIONS:

- Grapes are perennial crops and many nutrients are stored and located in the roots and wood. If a change in nutrient management is needed, make changes slowly over time and evaluate the effects through tissue monitoring.
When trying new products, especially non-conventional products, treat only part of the field and compare to the area where it was not used.

4. How do I manage nutrients in organic production?

Nutrient management in organic production is a long-term process. Since nutrients are largely supplied through the decomposition of organic materials, only a portion of the nutrients in the organic matter is released in a single year. Add new organic matter regularly over time to replenish the system.

Regular additions will eventually result in some 'left over' organic matter for the next season because only a portion is broken down into plant-available nutrients each year.

Over time, the amount of additional organic matter needed will decrease.

5. How do I add nutrients to non-organic vineyards?

Plants cannot take up nutrients if there is not any soil moisture; add water as well as nutrients.

If N is needed, split into three to four applications, applying the majority of the N between bloom and veraison to supply the crop demand.

- Placement: apply nutrients to the soil above the root zone and skip areas where roots are not growing. For example, in a drip irrigated vineyard, nutrients should be applied in a band under the drip line. Roots are rarely present in the middle of the mid-row area, even in a sprinkler irrigated vineyard.
Applying soluble nutrients through the drip system (fertigation) is a liquid banding technique commonly used.
Adding foliar nutrients: foliar application is particularly useful for micronutrient supplements if additions are needed. Foliar nutrients may be used in situations where soil conditions limit nutrient availability. Foliar application of N is not recommended.

6. How do I manage nutrients in concert with canopy and crop adjustments?

Significant cultural adjustments needed to manage canopy or crop, such as leaf thinning, indicate that future nutrient additions should be reduced.

CHECKLIST: BUILDING YOUR SOIL MANAGEMENT TOOLBOX

- Have I assessed my soil/site properties?
- Have I developed a database for my soil and/or tissue analysis results?
- Have I developed a yield, quality, and canopy management goals, by variety, for my vineyard?
- If available, have I compiled a database of fertilizer (or other soil amendment) use history?
- Have I discussed nutrient management strategies with my winemaker and other vineyard consultants?



RESOURCES:

Christensen, P. 1969. Seasonal changes and distribution of nutritional elements in Thompson seedless grapevines. *Am. J. Enol.Vit.* 20:176-190.

Christensen, P. 1984. Nutrient level comparisons of leaf petioles and blades in twenty-six grape cultivars over three years (1979 - 1981). *Am. J. Enol.Vit.* 35:124 - 133.

Dow, A. I., and M. Ahmedullah. 1983. Soil fertility and nutrient management of Washington vineyards. WSU EB 0874.

Dow, A. I., W. J. Clore, A. R. Halvorson, and R. B. Tukey. 1983. Fertilizer guide for irrigated vineyards. Washington State University Cooperative Extension Service FG-13, Pullman, Washington.

California Fertilizer Association. 1995. Western fertilizer management handbook. Interstate Publishers, Inc. Danville, Illinois.

Havlin, J. L., J. D. Beaton, S. L. Tisdale, and W. L. Nelson. 1999. Soil fertility and fertilizers. Prentice Hall, Upper Saddle River, New Jersey.

Ingels, C. A., R. L. Bugg, G. T. McGourty, and P. L. Christensen. 1998. Cover cropping in vineyards. University of California Publications, Oakland, California.

Marschner, H. 1986. Mineral nutrition of higher plants. Academic Press, New York, New York.

Robinson, J. B. 1992. Grapevine nutrition. p. 17-208. B. G. Coomb and P. R. Dry, *Viticulture, Volume 2: Practices*. Winetitles, Adelaide, Australia.

Staben, M. L., J. W. Ellsworth, D. M. Sullivan, D. Horneck, B. D. Brown, and R. G. Stevens. 2003. Monitoring soil nutrients using a nutrient management unit approach. PNW 570-E. <http://eesc.orst.edu/agcomwebfile/edmat/PNW570-E.pdf>

Special thanks for their contributions:

- Joan Davenport, Ph.D. Washington State University, Prosser, Washington
- Robert Stevens, Ph.D. Washington State University, Prosser, Washington
- Rick Hamman, Ph.D., Hogue Cellars, Prosser, Washington
- Roger Gamache, Gamache Farms, Basin City, Washington
- Russ Smithyman, Ph.D., Ste. Michelle Wine and Estates, Paterson, Washington
- Jeff Sample, Terroir Nouveau Nurseries, Prosser, Washington



Washington Guide to Sustainable Viticulture

This document provided by the Washington Wine Industry Foundation's "Risk Management Education Program for the Northwest Grape Industry" — a USDA-RMA Partnership. For questions about VineWise, please contact the Washington Association of Wine Grape Growers at 1-877-88WAWGG (1-877-8892994) or email vinewise@wawgg.org.