Interpreting a Soil Analysis for Orchards or Vineyards

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Winter is a common time to perform soil analysis for orchard and vineyards. It is not critical exactly when samples are taken and if salts have been accumulating during the growing season they should become evident by early winter. It is wise to conduct soil analysis every 2-3 years to alert you to any chemical problems that are developing.

With orchards and vineyards, we rely on tissue (leaves, petioles or hulls) analysis and on visual assessments for making decisions about the nutritional status of the plant. We do not typically rely on soil analysis to develop fertilizer recommendations for trees and vines in California. The soil analysis is essential to finding out if you are developing a chemical problem of some sort. Tree and vine crops are usually more sensitive to the effects of salinity and toxic elements than most field crops and even some vegetable crops.

The laboratory that performs the analysis will often include some interpretive information to assist you in reading it. You can also call the lab, ask your Pest Control Advisor, or call the UC Farm Advisor for more explanation. Most of our Cooperative Extension production manuals have a discussion on nutrition, lab analysis and recommendations.

pH This is the measure of how acidic or basic the soil is. Generally we want to be near 7.0 which is neutral, or slightly acidic (6.5 to 7.0). This range is where you have the best overall nutrient availability and no pH related problems.

EC An abbreviation for “electrical conductivity”, this is a general measurement of how salty the soil is. With orchards and vineyards we are trying to stay below 1.0 if at all possible. As the soil becomes more salty, you begin to have reduced availability of some nutrients, toxicity symptoms and water infiltration problems. Traditionally EC has been expressed as millimhos per centimeter (mmhos/cm). A more modern unit of measurement is deci-cemens / milliliter. A full discussion can be found in *Agricultural Salinity and Drainage* – ANR publication #3375, available from most Cooperative Extension offices.

B Boron is of interest to growers in some areas of the state where B can be high enough to cause toxicity in sensitive crops. In the Central Valley for example, B toxicity is more commonly found on the west side of the Valley – especially along I-5. We hope to have values < 1.0 ppm (parts per million).

Cl Chloride can be toxic to plants in high quantities but it is easy to leach out if there is good deep percolation. A value of < 5.0 meq/liter is desirable (which is equivalent to 175 mg/liter).

SAR The Sodium Adsorption Ratio is used to determine the potential sodium hazard of irrigation water. More on that in another article.

ESP The Exchangeable Sodium Percentage represents what percent of the soil exchange sites are taken up by sodium. To avoid water infiltration problems we want a value that is < 10 but for sensitive crops the value should be < 5

CEC Cation Exchange Capacity is a measurement of the capacity of the soil to hold onto positively charged nutrient cations, such as magnesium (Mg) , potassium (K), and calcium (Ca). Mineral soils with higher CEC are typically more fertile because they have less loss of nutrients due to leaching.

Base Saturation This represents how much of the CEC is taken up by cations that are of interest such as Ca, Mg, K, H or Na. Typical ratios would be 20-80% for Ca, 10-40% for Mg and 1-5% for K.

Organic Matter Some times referred to as "OM". In the hot, arid, West, OM is typically very low – especially under irrigated conditions. For practical purposes, in the Central Valley, this value has little impact on our decisions.

Saturation Percentage (SP) This is simply a laboratory method of determining the soil texture: Clay, clay loam, sandy loam, etc. You probably already know that or can look it up in the soil survey so there is little value in having it determined again.

Bicarbonates & Carbonates These are determined as part of the process in determining the ESP. Waters that are high in these can lead to plugging of the drippers or micro jets.

More information: A good discussion can be found in Chapter 12 of the Stonefruit Production Manual, ANR publication # 3331; also in Chapters 5 & 26 of the Almond Production Manual, ANR publication # 3364. Both are available at most Cooperative Extension offices.