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Grower perspectives on grape irrigation

A grower's presence in the vineyard is the most important irrigation tool.

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Numerous tools are available to help wine grape growers monitor plant water use and soil moisture and schedule irrigation. It's not so much the specific tool that's important, but knowing the vineyard soil, understanding vine response to water stress, and being in the vineyard.

Jim McFerran, director of vineyards for Washington State's Milbrandt Vineyard in Mattawa, believes that understanding the soils, and everything about them—from water-holding capacity and depth, to texture, stratification, and variability—is key to wine grape irrigation.

"Ideally, you want to draw a conclusion of the soil characteristics of the site before you think about your irrigation system," McFerran said. Growers should avoid situations like a 60-acre vineyard block that has six soil types and only three valves on the main irrigation line. "With that much soil variability, that is not what you want to do."

Growers who understand their soil can establish meaningful production goals or tiers, as McFerran called them. At Milbrandt Vineyards, four tiers are used to distinguish wine styles among vineyards and guide deficit irrigation strategies, canopy management, and tonnage goals.

Generally, for red grapes, he follows a regulated deficit strategy, applying 50 to 60 percent of the soil water-holding capacity. For white grapes, higher yields are usually targeted, so the shoots can be longer, and slightly more water is applied (60 to 70 percent of water-holding capacity).

McFerran meets weekly with an irrigation consultant. Together, they review shoot measurements and weather forecasts to schedule irrigations for the coming week. "My role in that is to look at every single block so I can understand and visually see what's going on and to be sure that these vineyards are meeting our production goals," he said.

Growers can use a wide variety of tools to determine how much water to apply, such as soil moisture sensors and probes, pressure chambers to measure leaf water potential, aerial imagery to show vine vigor differences, shoot growth and elongation, berry growth curve, evapotranspiration (ET) data, and visual observations. Recording weather data,

either through a private weather station or Washington State University's AgWeatherNet, can help quantify weather events, while weather forecast information can help guide irrigation scheduling for the coming week.

"The important thing is that you understand the data you are collecting and can correlate it to your vineyard," McFerran stressed. "You need to know what the data means and how relative it is to what you're seeing in the vineyard. But of all the tools available, the most important is your presence."

Vine growth

Tracking berry growth is a good way to monitor vine growth status, though not often done, McFerran said. "I wish we had more time as growers to use the berry growth curve, because it's probably the most sensitive piece of information that we have available." To monitor berry growth, 100 berries are collected and weighed every three days, with the growth plotted on a chart. "The minute the berry stops growing, you can see it, even before it's detectable in the field."

He added that he relies heavily on shoot elongation measurements to determine if the vine is actively growing. As vine growth slows down, he looks for the last leaf on the shoot the size of a quarter and observes the distance between that leaf and the shoot tip. A distance of several inches indicates the vine is actively growing, while a very close distance means growth has stopped.

Eric Wylie, agricultural engineer for Ste. Michelle Wine Estates, who joined McFerran during industry talks on irrigation, said that he also looks at the vine's tendrils. In a vine that is actively growing, tendrils will be further out than the shoot tips. Tendrils that are equal or below the shoot tip indicate the vine is going into stress. Wylie measures the total shoot growth (measuring from the base at the cordon to the last fully exposed leaf) on a weekly basis and plots the data on a graph. A growth rate of two to three centimeters per day indicates the vine is growing. A centimeter or less, and the vine is under stress.

Another stress indicator is leaf temperature. Leaves under stress are usually warm to the touch, though warm leaves can also be a response to heat stress if temperatures are high. Vine response to heat can be confused with water stress, so it's important that growers know whether a vine has shut down because of heat or shut down because of water stress.

Efforts worthwhile

Jason Magnaghi, viticulturist for Figgins Family Wine Estates in Walla Walla Valley, in sharing his irrigation strategies, said his philosophy is to grow the canopy first. A neutron probe provides soil moisture information, but Magnaghi also carries a soil probe so he can pull soil core samples and check moisture in between receiving weekly data from the neutron probe service. He applies irrigation amounts based on weather, evapotranspiration curves, size of the canopy, and time of year, and targets irrigations to be 50 to 70 percent of the potential water use.

Are all the efforts to induce plant water stress really worth it?

Magnaghi said that since implementing regulated deficit irrigation, Figgins Family Estates has produced better quality grapes and received higher prices for grapes sold to outside wineries. Plus, they have saved money in lower pumping costs and reduce labor costs from less pruning and shoot thinning.

Red Mountain grape grower Jim Holmes, who collects and tracks soil moisture data from 50 different locations throughout his vineyard blocks, believes that irrigation is just one piece of the grape quality picture. "Quality in the vineyard is a really big picture," he said. "You probably can't win the game with your irrigation strategy, but you can lose the game with irrigation. If you're a small grower, just do the best job that you can."

Wylie said the essence of wine grape irrigation is understanding vine response, knowing what your soil moisture levels are, and projecting the coming week of weather.

"You know where you are right now, but where do you want to be next week? Do you want to maintain growth, increase or decrease stress?" Wylie asked, adding that the only variable a grower can control to change vine growth is irrigation.

The discussion was held at the annual meeting of the Washington Association of Wine Grape Growers.