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Wine grape varieties responded similarly to drought in a Washington State University study

Researchers said canopy size, soil type and wine style may guide irrigation better than assumptions about a vine’s drought tolerance

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Washington State University researchers said on Tuesday, November 10, that new findings could change how winegrape growers decide when and how much to irrigate, with potential implications for water use, vineyard costs and fruit quality in drought-prone regions.

The study, published in BMC Plant Biology, found that grape varieties do not necessarily differ in how they respond to drought in the way many growers and researchers have long assumed. Instead, the researchers said irrigation decisions may be better guided by factors such as canopy size, soil type and the style of wine a grower is trying to produce.

The work was based on a two-year trial involving 30 grape varieties. According to the research, the vines showed similar stomatal responses to drought. Stomata are tiny pores in leaves that help control water loss and gas exchange, and they are a key measure of how plants react under dry conditions. The results suggest that presumed built-in drought tolerance differences among varieties may matter less in practice than other vineyard conditions.

Markus Keller, the study’s corresponding author and the Chateau Ste. Michelle Distinguished Professor in Washington State University’s Department of Viticulture and Enology, said the findings run against a common scientific view. He said growers making irrigation decisions should focus more on canopy size, soil type and wine style than on assumed physiological differences between varieties.

Researchers also found that larger canopies use more water and reach drought-stress thresholds sooner than smaller ones. That finding points to a more direct way to estimate water demand in vineyards, especially during hot and dry periods, because leaf area and vine growth can have a stronger effect on water use than the name of the variety alone.

Keller said published research on breeding varieties for better drought adaptation often contains contradictions. Those differences, he said, can appear even within the same variety depending on how severe the water stress is, the time of season, the rootstocks used for grafting and the methods used by different researchers. That means growers who base irrigation plans mainly on a variety’s reputation for drought tolerance may be

relying on an overly simple guide.

The study points toward a more practical approach in the field. If growers match irrigation more closely to canopy size and site conditions, they may be able to avoid applying water that is not needed, lower irrigation costs and still protect grape quality. In regions where water supplies are under pressure, that could also support longer-term vineyard sustainability.

The findings could matter beyond the farm. For wineries and other beverage businesses that depend on a steady supply of quality winegrapes, more precise irrigation planning could help limit water use and control production costs while reducing the risk that drought stress will hurt fruit composition. In areas where water availability is becoming a bigger business concern, the research may give growers and wine producers a more reliable basis for planning than broad assumptions about which varieties are supposedly more drought hardy.

Washington State University said the results could help growers fine-tune irrigation strategies as water becomes a more important constraint for the state’s winegrape industry. The research adds to a growing body of work aimed at helping vineyards adapt to drier conditions without sacrificing crop performance or wine style.