*Summary 164*

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# Assessment of plant hydraulics in grapevine on various "terroirs" in the canton of Vaud (Switzerland)

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• The goal of this paper was to compare various indicators of plant water stress. To that purpose, the authors sampled 30 sites from famous vineyards in four viticultural areas in the Vaud wine region, Switzerland. Almost all the soils consisted of alpine moraines, that is, a heterogeneous mix of different-size debris that had been transported by the Rhone glacier. Moraines can be classified into 3 types of parent-rock: bottom moraines (few stones); stony lateral moraines (30-60% stones), and retreating moraines (>60% stones).

• The authors then calculated the soil water-holding capacity at each depth in each soil profile. From this data, they calculated the amount of water available to the grapevines on each site, which they presented on a table. Water-holding capacities ranged from 50 mm in retreating moraines to 250 mm in marly sandstones.

• Finally, and for 3 seasons (2001-2003), they measured the following indicators of water stress: 1) pre-dawn leaf water potential, mid-day leaf water potential, and stem water potential; 2) *carbon isotopic discrimination.* (In this technique, the ratio of the heavier isotope $^{13}C$ to $^{12}C$ in the must sugars is calculated by mass spectrometry. Plants discriminate against $^{13}C$, so high $^{13}C/^{12}C$ ratios –low discrimination- means high transpiration efficiencies, or low water loss for the same biomass). The authors also measured 3) transpirable soil water. For this calculation, the authors used a model that considers the soil as a reservoir that fills up by precipitation, and empties through evapotranspiration. (The model estimates transpirable water based on water potential readings, potential evapotranspiration, rainfall, and size and shape of the plant).

• Let's see how good each measurement was at estimating water-holding capacity for each soil.
1) **Water potential measurements**. Pre-dawn leaf water potential was well correlated with soil water content. As expected, no water stress (small negative water potential values) was found in soils with high water-holding capacity. On the other hand, moderate-to-high water stress was recorded at the end of the season in those sites with low water-holding capacity (some of which had dropped leaves in the fruit zone in July and August). As in previous studies, the authors found a linear relationship between pre-dawn leaf water potential and stem water potential. [The authors make no reference to how mid-day leaf water potential compared with these two].

• 2) **Carbon isotopic discrimination measurements**. The authors observed a good correlation between carbon isotopic discrimination in grape sugars at harvest and plant water potential, using both pre-dawn and stem water potentials.

• 3) **Transpirable soil water model**. In general, transpirable soil water values derived from the model were slightly higher than soil water-holding capacity estimations. Still, this is encouraging for the authors, who plan to keep refining the model. In their opinion, the advantage of being able to use a water assessment model like this is that it is able to discriminate several levels of water stress, including information of its *earliness*, its *duration*, and its *intensity*.

The authors concluded that *water potential* measurements– both pre-dawn and stem- estimated water-holding capacity of different types of soils the best. *Carbon isotope discrimination* was next. Finally, *total transpirable soil water* - estimated by combining model values with water potential values – showed a good agreement, but the authors are planning to improve it further.

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