

Leaf wetness spatial variability within grapevine canopy

By: A. Dalla Marta, L. Martinelly, and S. Orlandini

In: American Journal of Enology and Viticulture. 59(1):78-82. 2008

- The length of time a vine leaf stays wet – leaf wetness duration, or LWD- strongly influences disease development. Additionally, the temperature difference between the canopy and the surrounding air is one of the main factors controlling the onset of dew, and therefore, leaf wetness. Finally, several disease forecast systems use sensors placed inside the canopy, so having LWD information could be useful to determine the best sensor locations.
- All of the above prompted these authors to explore the spatial variability of leaf wetness in a vertical canopy, and its relationship with canopy temperature. The study took place in 2005 in Tuscany, Italy, in a Sangiovese vineyard. The vines were single-cordon trained and spur pruned, forming a wall 80 cm high. Spacing was 1 x 3 m and row orientation was N-S with a 16% slope facing south. Leaf area index was 2.7. The authors inserted 6 **wetness sensors** per vine (2 in each canopy portion: bottom, middle and top). They also inserted 4 **leaf temperature sensors** (in the external part of the canopy: 2 at the bottom, 2 at the top), as well as 4 **air temperature sensors** (right outside the canopy: 2 at the bottom, 2 at the top). The authors maintained this “bottom-middle-top” sensor arrangement throughout the season by continuously moving the sensors as the vines grew.

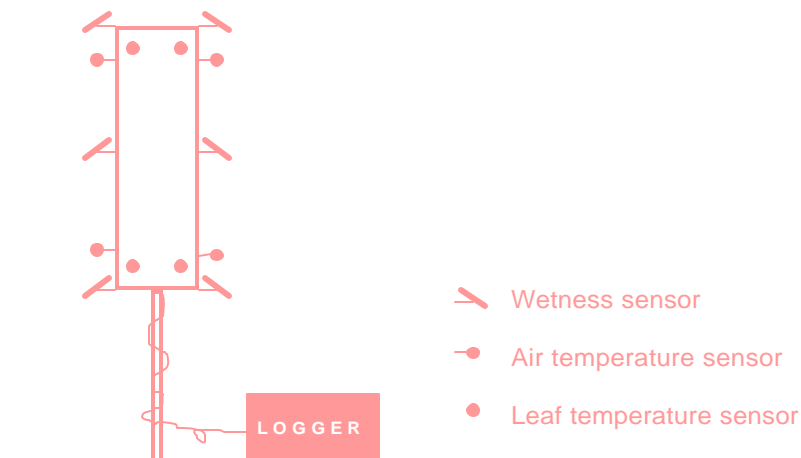


Diagram by authors

- In addition to placing the sensors, the authors conducted visual inspections in the middle of the night, observing the leaves with a flashlight, and noting the percentage of wet leaf area. They did this starting at 10 pm and continuing until the leaves reached complete wetness -normally, in the very early morning hours. (At sunrise, evaporation starts taking place and all leaves dried in less than one hour). A canopy portion –bottom, middle or top- was considered “wet” when at least 10% of its leaf area was wet.

• **Results**. 1) Regarding the *timing* of wetness, **the top of the canopy always started to be wet earlier than the middle or the bottom**. 2) As for the *pattern* of wetness, it appeared gradually and in all leaves at the top, whereas at the bottom it took place mostly on the outside leaves, with the interior ones remaining dry. 3) **Leaves at the top of the canopy were cooler than those at the bottom**. The overall result was that, at the top of the canopy, leaf temperature was lower than air temperature –therefore causing water condensation-, whereas at the bottom, air temperature was lower than leaf temperature. The authors attribute this difference to radiative cooling taking place on the top leaves directly exposed to the air. At the bottom, this canopy cooling during the night was much slower due to the protective effect offered by the leaves above.

In summary, this study gives a good idea of how “wetness” appears. The authors show that leaf wetness duration is longer at the top than at the bottom of cordon-trained vines, and that canopy temperature varies in a similar manner –colder at the top than at the bottom. The authors do not really compare wetness variation in the horizontal axis of the canopy, since their sensors are all “external”. Even though they don’t elaborate on what the exact optimal position for sensors would be, the authors recommend using more than one sensor per vine -depending on canopy size and density- when estimating canopy wetness.

Author: Bibiana Guerra, Editor: Kay Bogart. This summary series funded by J. Lohr Vineyards & Wines.