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Automated water status monitoring in grapevines

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The wine market is increasing in economic importance, so it is crucial for producers to be competitive, efficient, and productive. In addition, climate change requires the adoption of adaptive strategies for a more efficient management of natural resources. Especially in semi-arid regions, the limitation in water availability for crop farming requires adaptive strategies aiming to optimize water productivity. Knowing the optimal moment for irrigation and the water amount to apply is essential information for deficit irrigation of wine grapes. Stem water potential measurements, using the pressure chamber approach, provide an accurate technique for determining plant water status and timing irrigation. In combination with accurate ET measurements, the plant-based measurements offer the information needed to establish water saving deficit irrigation schedules. Collecting stem water potential data, however, is time-consuming and labour-intensive. This work presents the preliminary results of a comparison between new plant-based sensors, which continuously monitor the water status using an automated platform. A field study was conducted on a representative vineyard located in the Mediterranean Basin (Sardinia, Italy). Sensor data were compared to measurements of stem water potential. Two treatments were employed in the experiment: i) mild to moderate water stress conditions were applied from fruit set until ripening; ii) no irrigation from bunch closure until harvest, which resulted in moderate to severe water deficit conditions. In both treatments, stem water potential measurements were monitored weekly on adult leaves with a pump-up pressure chamber, while the T-Max method was used to determine the xylem sap flow. Leaf thickness, an indirect measurement of leaf turgor, was measured with a commercial sensor. Preliminary results showed a good potential for these promising techniques that may monitor proxies of the vine water status in an automated way, giving useful and user-friendly information for planning efficient irrigation schedules. In addition, micrometeorological measurements provide a method for assessing the actual ET rates between irrigation events, and this effort will be studied in future field experiments. Preliminary results showed a good potential for these promising techniques that may monitor proxies of the vine water status in an automated way that, in conjunction with reliable ET estimates, provide the information needed to determine user-friendly information for

planning efficient irrigation schedules for deficit irrigated wine grapes.