

## **Approaches and challenges of soil water monitoring in an irrigated vineyard**

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Monitoring of water content is an approved method to quantify certain components of the soil water balance, for example as basis for hydrological studies and soil water management. Temporal soil water data also allow controlling water status by means of demand-oriented irrigation. Regarding spatial variability of water content due to soil characteristics, plant water uptake and other non-uniformities, it is a great challenge to select a location that is most likely representing soil water status of a larger area (e.g. an irrigated field). Although such an approach might not satisfy the requirements of precision farming – which becomes more and more related to industrial agriculture – it can help improving water use efficiency of small-scale farming. In this regard, specific conditions can be found in typical vineyards in the eastern part of Austria, where grapes are grown for high quality wine production. Generally, the local dry-subhumid climate supports grape development. However, irrigation is temporarily essential in order to guarantee stable yields and high quality. As the local winegrowers traditionally control irrigation based on their experience, there is a potential to improve irrigation management by means of soil water data.

In order to gain experience with regard to irrigation management, soil water status was determined in a small vineyard in Austria (47°48'16" N, 17°01'57" E, 118 m elevation). The vineyard was equipped with a subsurface drip irrigation system and access tubes for measuring water content in soil profiles. The latter was measured using a portable device as well as permanently installed multi-sensor capacitance probes. Soil samples were taken at chosen dates and gravimetrically analyzed in the laboratory. Water content data were analyzed using simple statistical procedures and the temporal stability concept.

Soil water content was interpreted considering different environmental conditions, including rainfall and irrigation periods, and influences from tillage operations. Variability of sensor readings was substantial across the study plot. However, locations could be identified that were most likely representative for soil water monitoring. Tillage operations and weed growth in the inter-rows had a recognizable impact on soil water distribution, which also has to be considered when installing probes. Furthermore, the distance of sensors to drip emitters was of great importance for correctly interpreting data for irrigation management.