

Report on Monitoring Tool evaluation

Action B1

31.12.2023



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Summary

The evaluation of the prototype and beta version of the monitoring tool (MT) was conducted during the second and third year of the DRIVE-LIFE project thanks to the involvement of the demo-farms, living labs, and multiple stakeholders in the context of co-development activities (Action B3).

The feedbacks received – which proved crucial to improve and refine the MT final (release) version – were collected in different ways, both in written form (e.g., survey, emails, etc) and – most of them – as oral comments provided during the multiple events of co-development (see also Deliverable “*Report on activities to increase stakeholders’ awareness*” and Deliverable “*Report on Co-Development activities*”). This document is an effort to collect and synthesize all those activities and feedbacks, highlighting the actions undertaken/planned to address the issues raised and the suggestions received.

The monitoring tool evaluation – events and activities

Thanks to the participatory approach underpinning the DRIVE LIFE project, multiple stakeholders were involved in the evaluation of the Monitoring Tool from the very beginning.

The following table (Table 1) summarize such events and their role for the MT development, whereas Figure 1 highlights some example of vineyards where the MT was actively evaluated by the stakeholder, farmers, technicians and researchers involved in the events of MT co-development (e.g., Living Labs).

Table 1. Events conducted to evaluate the MT and collect feedbacks for further development.

Stage of MT development	Events	Parties involved	Comments
Building of the MT prototype and development of the beta version	Co-Development meetings: - presentation and evaluation of the MT mock-up - evaluation of the usability of the MT prototype	Demo farmers and project partners	Given the key role of the tool usability, a mock-up of the app was presented and discussed with demo-farmers and other project partners during dedicated events of co-development (Action B3; meeting held on November 25 th , 2021) and project meeting (December, 2 nd , 2021). The mock-up of the app was made available online by using dedicated emulating technologies. This enabled accessing the mock-up directly from any smartphone, ensuring a better simulation of the user experience and the provision of effective feedbacks. The MT was then refined according to the feedbacks received, and the improved (beta) version was made available to project partners and

			Living Labs for use during the season 2022.
Evaluation and refinement of the MT beta version	Living Labs field visit (IT)	Living Labs, demo-farmers, project partners	The Living Labs events held on June 8 th -9 th 2022, were crucial to extend the evaluation of the MT outside the study area. The practical session of MT use conducted during the field visit allows to collect feedbacks on the tool usability and on further development (e.g., varieties to include in the MT calibration for water stress diagnosis).
	Dissemination events: Enovitis 2022	Farmers Technicians Agronomist Researcher Technical journals	This field event allowed to present and discuss the MT with multiple stakeholders. The feedbacks received highlighted: (i) positive evaluation on the MT usability and on its utility to effectively support management of drought in vineyards; (ii) clear interest in the relationships derived between canopy architecture and stomatal conductance from companies that develop tools for quick detection of water stress in vineyards.
Presentation and evaluation of the English version of the MT	Living Labs Webinar (IT/EU)	Farmers Technicians Agronomist Researcher	During the Webinar conducted for European Living Labs on April 5 th 2023, the English version of the MT was presented and made available to participants for test in their own fields together with technical documentation and user guide.
Evaluation and presentation of the MT final (release) version Definition of the after-LIFE market strategy and MT further developments	Co-development meetings	Demo-farmers Project partners Stakeholders	The feedbacks received about the different users interested in using the MT after-LIFE (e.g., farmers, technicians) collected during the final co-development meeting (held on November 3 rd , 2023) were crucial for the definition of the after-LIFE MT market strategy.
	- Enovitis 2023 - Final Conference	Farmers Technicians Agronomist Researcher Stakeholders	

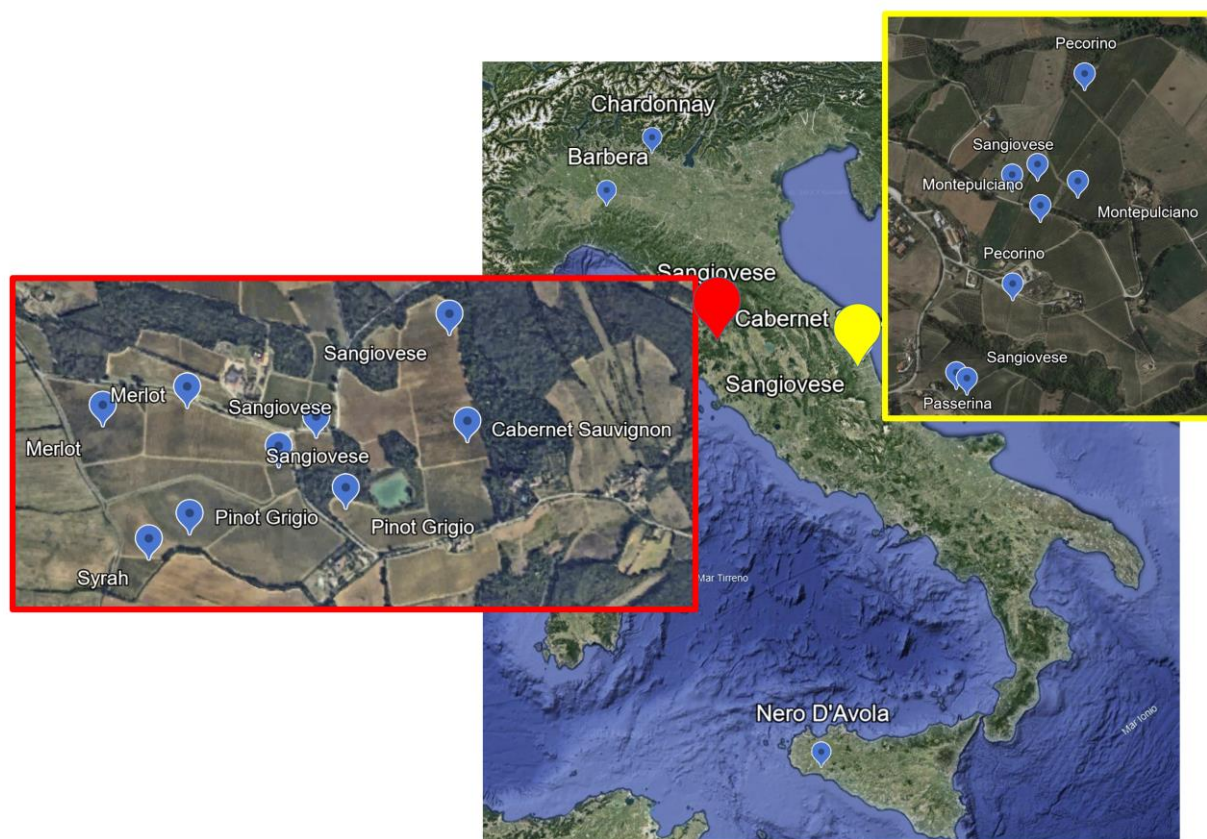


Figure 1. Example of vineyards where the MT was used during 2022 and 2023. The name of the grape cultivar is reported for each vineyard. The red and yellow squares zoom in the areas where the MT was used in multiple vineyards.

The monitoring tool evaluation - results

Feedbacks received	Action/s conducted	Action/s planned (after-LIFE)
Need for including comments (e.g. metadata) alongside the measurements of LAI and water stress diagnosis	The MT was improved providing the possibility of adding comments. Such comments are then shown together with the measurements value, date, vineyard, and GPS position within the vineyard.	
Need of deleting measurements in case of errors	The MT was improved to allow deleting the last measurements of both LAI and canopy architecture	
Need to have a measure of variability between replicates of LAI in a given point of the vineyard	The MT was refined to save both the mean and the standard deviation of LAI replicates for each sampling point.	

<p>Need to define a protocol for evaluate canopy architecture that strike a balance between accuracy of water stress diagnosis and parsimony of effort for field measurements</p>	<p>Sample size analysis was used to define a protocol of acquisition, which showed that just ten leaves randomly sampled in the middle section of the canopy are enough to achieve reliable estimate of canopy architecture and related water stress diagnosis. The MT has been thus provided with a function that keeps count of the leaves sampled and allows to verify water stress only after ten leaves has been scanned. More details are available in the MT scientific and technical documentation (Deliverable B1.2)</p>	
<p>Development of the MT version for other platforms (iOS)</p>		<p>MT development for iOS platform has been planned in the after-LIFE</p>
<p>Calibrate the tool for additional cultivars for the diagnosis of water stress. Examples of cultivars highlighted as of specific interest were: Pinot grigio, Ortrugo, Barbera, Riesling italico</p>		<p>Experimental activities will be conducted after-LIFE to derive relationships between canopy architecture and stomatal conductance for additional cultivars. Cluster analysis is also planned to evaluate similarities between cultivars with isohydric or anisohydric behaviour.</p>
<p>Clear interest from researchers and companies working on relationships between canopy architecture and water stress</p>		<p>New collaborations/joint experimentation will be evaluated.</p>
<p>Interest in using the MT from technicians/agronomist</p>		<p>The market strategy for the after-LIFE exploitation of the MT will consider different type of users. For farmers using the MT on their vineyards only, there will be an annual subscription with a fee based on the hectares managed with the MT. For other professional (e.g., agronomists) covering wide areas, the MT fee will be evaluated through dedicated commercial agreements.</p>

<p>Interest in using the MT for mapping drought-prone vineyards in order to identify those needing irrigation systems.</p>		<p>This case study will be evaluated for further extending the use of the MT.</p>
<p>Interest in using the MT as a tool to objectively prove the occurrence of severe water stress triggering the use of irrigation water in contexts where the wine production regulations only allows emergency irrigation.</p>		<p>This case study will be evaluated for further extending the use of the MT.</p>