



**Practice Abstract 28 -
An Integrated Digital Dashboard and Decision-Support
System for Rapid Pesticide Residue Testing in Olives and
Olive Oil (SafeOlive OC SIP)**

28. An Integrated Digital Dashboard and Decision-Support System for Rapid Pesticide Residue Testing in Olives and Olive Oil (SafeOlive OC SIP)

Short Summary for Practitioners in English

Problem:

Olive growers and olive oil producers must ensure that their products comply with EU Maximum Residue Limits (MRLs). However, access to rapid and affordable pesticide residue testing is limited. Conventional laboratory analyses may cost approximately €80-140 per sample and often require three to five days, depending on the laboratory and analytical method. This delay can make it difficult to take timely decisions before harvesting olives, accepting a small batch at an olive mill, or releasing olive oil for further processing. Residues may also occur because of incorrect pesticide use, incomplete pre-harvest intervals or spray drift from neighbouring fields. Laboratory testing is particularly difficult to justify for small quantities of olives or olive oil, because the testing cost may be high compared with the value of the batch. Farmers and processors therefore need a rapid and lower-cost screening method that can support initial decisions on harvesting, processing and the need for further laboratory analysis.

Solution:

SafeOlive is an Agricultural Digital Solution developed for olive growers, cooperatives and olive oil producers. It combines the B.EL.D™ portable biosensor with a mobile application, Digital Field Book and Decision Support System. The B.EL.D™ biosensor supports rapid, on-site screening of pesticide residues in olive fruits and olive oil. During the project, the method was calibrated separately for lambda-cyhalothrin and chlorpyrifos-methyl, using 400 calibration samples for each substance, corresponding to 800 samples in total. The calibration achieved approximately 95% method accuracy under the tested conditions. The measurement phase takes approximately three minutes after the sample-extraction step has been completed. The result is displayed in a simple Above/Below MRL format, helping users identify whether a sample may require further attention. During pilot implementation, 50 olive fruit and olive oil samples were tested. All produced Below-MRL screening results. Half of these samples, corresponding to 25 samples, were also submitted for laboratory cross-validation. B.EL.D™ is intended as a rapid screening and decision-support method. It does not replace accredited laboratory analysis when an official result is required for regulatory compliance, certification, enforcement, export or commercial purposes. The SafeOlive application combines biosensor outputs with: pesticide application and active-substance records; pre-harvest intervals; weather conditions and a five-day forecast; olive fruit fly risk information; spray application conditions; satellite vegetation-index summaries; farm activities recorded in the Digital Field Book. The system provides practical recommendations such as: olive fruit fly risk: low, medium or high; spray application conditions: low, medium or high risk; earliest possible harvest date after pesticide application; harvest reminders; recommendation to harvest, wait, re-test or request laboratory confirmation.

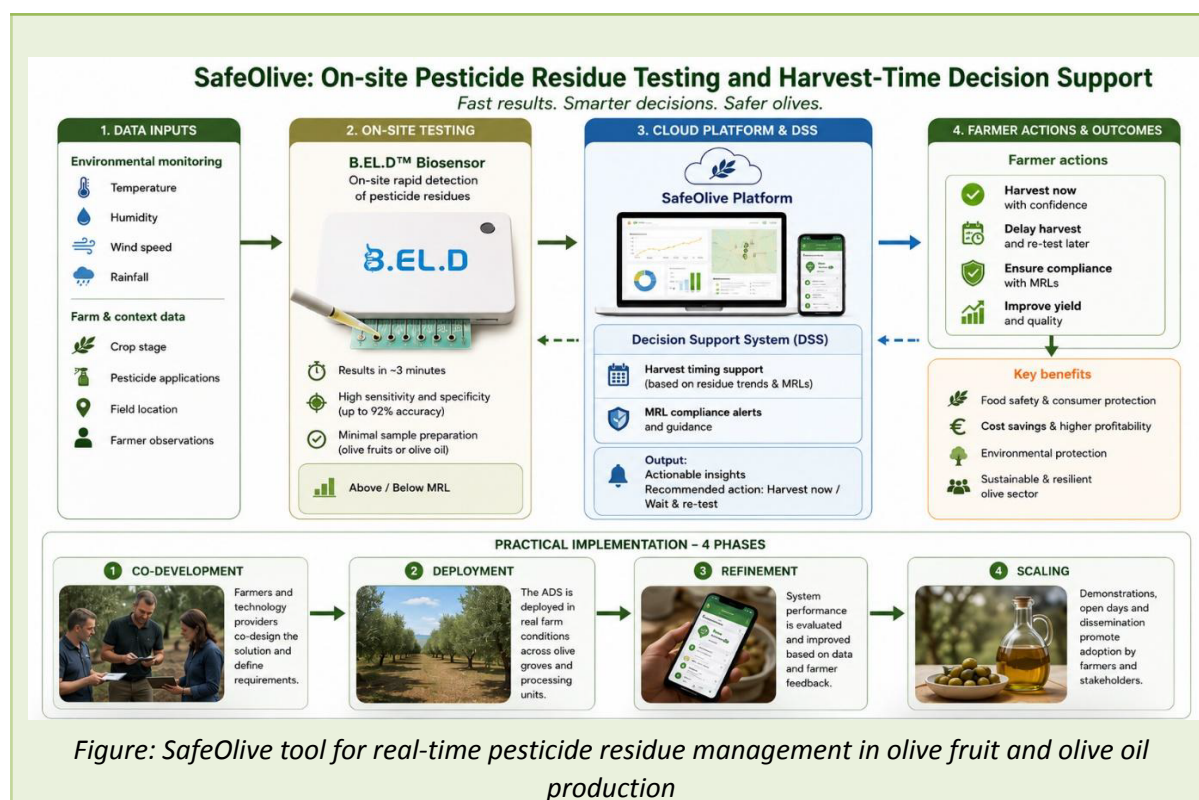
Benefits & Results demonstrated during the pilot:

calibration with 400 samples per target substance; approximately 95% method accuracy under the tested calibration conditions; approximately three-minute measurement after sample extraction; on-site testing without the need to transport every sample to a laboratory for initial screening; testing of 50 pilot samples from olive fruits and olive oil; laboratory cross-validation of 25 pilot samples; simple Above/Below MRL result presentation; integration of weather forecast and satellite monitoring services; implementation of olive fruit fly and spray application advisories; calculation of pre-harvest intervals and earliest harvest dates; digital recording of pesticide

applications, sampling and harvesting activities. Farmers and olive oil producers responded positively to the rapid-testing concept. Olive oil producers particularly highlighted its potential value for small batches, for which conventional laboratory testing is often not economically justified. Expected benefits with continued use of SafeOlive are expected to support: faster decisions before harvest, processing or batch acceptance; lower routine screening costs for small olive and olive oil batches; better identification of samples that require accredited laboratory confirmation; improved management of pre-harvest intervals; improved awareness of MRL compliance and food safety; reduced risk of harvesting too early after pesticide application; potential reduction of unnecessary or poorly timed pesticide applications; potential reduction in rejected products and associated economic losses; improved traceability through digital farm records. The effects on total pesticide use, overall MRL-compliance rates and rejected-product reduction were not fully measured over a complete spraying and harvesting cycle. These should therefore be considered expected benefits requiring further field validation.

Affordability and Scalability: SafeOlive is designed to be provided through a Software-as-a-Service model. The proposed pricing is indicative and will be refined following the final technical and market evaluation. The preliminary model includes: an annual platform subscription of approximately €100 per hectare; a pay-per-test option of approximately €20 per test; cooperative or shared-device models that allow several farmers or an olive oil mill to share the B.EL.D™ device and platform costs. These options aim to make the solution more accessible to small and medium producers. SafeOlive can also be scaled across Mediterranean olive-growing regions. The B.EL.D™ device is portable and requires limited on-site infrastructure. It can be used independently for rapid screening or connected to the SafeOlive platform. The digital solution can be adapted by updating: pesticide active-substance lists; national pre-harvest intervals and regulatory requirements; local weather thresholds; olive fruit fly risk rules; language and user instructions; farm and field information. Weather and satellite services can be connected remotely once the farm location and field boundaries are registered.

Practical Recommendations: Farmers and processors should: 1. Collect representative olive fruit or olive oil samples. 2. Follow the defined sample-extraction and B.EL.D™ testing procedure. 3. Record the pesticide active substance, application date and pre-harvest interval in the Digital Field Book. 4. Interpret the screening result together with spray history, weather conditions and the planned harvesting date. 5. Delay harvesting and re-test where the result or available records create uncertainty. 6. Request accredited laboratory analysis when the result is Above MRL, unclear, inconsistent with farm records, or required for official regulatory, certification, export or commercial purposes. SafeOlive should complement farmer experience and official laboratory testing by providing rapid information that supports decisions on whether to harvest, wait, re-test or seek formal confirmation.



Further information

- n/a

About this practice abstract and Farmtopia

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Farmtopia: The project is running from September 2023 to August 2026. The overall goal of Farmtopia (**GA No.: 101083541**) is to democratize digital farming to empower small and medium farms.

Website: <https://farmtopia.eu/>

SK EMBIO Diagnostics Ltd: SIP leader, ADS provider

Website: <https://embiodiagnostics.eu/products/belddevice/>

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