



**Practice Abstract 25 - A Precision Variable-Rate Spraying
Solution for Orchards Using Satellite and ISOBUS
Technologies (SPRAYBUS OC SIP)**

25. A Precision Variable-Rate Spraying Solution for Orchards Using Satellite and ISOBUS Technologies (SPRAYBUS OC SIP)

Short Summary for Practitioners in English

Problem:

Mediterranean orchard crops such as olive and citrus require repeated applications of plant protection products and fertilizers under highly variable canopy conditions. Differences in tree size, vigour and planting density often result in over- or under-application when conventional uniform spraying is used, reducing treatment efficiency, increasing input costs and causing unnecessary environmental losses. Although Variable Rate Technologies (VRT) can address these challenges, their adoption by small and medium-sized farms remains limited. Most commercial solutions require external GIS software, prescription-map generation, shapefile transfer and expensive brand-specific machinery. These complex workflows, together with limited digital skills and heterogeneous machinery fleets, prevent many orchard farmers from using precision spraying technologies in their daily operations.

Solution:

SPRAYBUS is an in-cab Agricultural Digital Solution that enables farmers to generate and execute variable-rate prescription maps directly from the tractor. Using freely available Sentinel-2 satellite imagery and vegetation indices, the system identifies orchard management zones and automatically adjusts spray dose and section control according to crop vigour.

Unlike conventional VRT solutions, SPRAYBUS does not require external GIS software or manual shapefile transfer. It operates with both ISOBUS and non-ISOBUS machinery, works offline under poor connectivity conditions and automatically records field operations through integration with the Farmtopia Digital Field Book and Pest Risk Data services, simplifying both spraying operations and regulatory documentation.

Benefits:

Field validation demonstrated that SPRAYBUS successfully generated and executed variable-rate prescription maps directly from the tractor cab while operating reliably with both ISOBUS and non-ISOBUS machinery. The time required to prepare prescription maps was reduced from a conventional workflow of approximately two days to only 1–3 minutes under the tested conditions, substantially simplifying daily farm operations. Spraying trials also showed that variable-rate applications maintained crop coverage comparable to conventional spraying, while significantly reducing spray deposition on the soil, indicating lower off-target losses without compromising canopy coverage. In addition, the successful integration of the Farmtopia Digital Field Book and Pest Risk Data API, together with validated offline operation, reduced administrative workload and enabled field operations to continue even in areas with limited mobile connectivity.

Practical recommendations:

Before implementing variable-rate spraying, farmers should ensure that orchard boundaries are correctly defined and that the sprayer has been properly calibrated. Prescription maps should always be checked before field application to confirm that management zones match crop variability. SPRAYBUS is particularly suitable for farms using conventional or non-ISOBUS machinery, allowing existing equipment to be upgraded without major investment. Farmers can generate prescription maps directly in the field and continue working even where mobile coverage is limited, as operational data are stored locally and synchronised later. Field experience also showed that involving farmers during system configuration and carrying out initial validation under

real operating conditions improves confidence, simplifies adoption and helps achieve more efficient and sustainable spraying operations.

Further information

- ISOBUS Agricultural Electronics Foundation (AEF): <https://www.aef-online.org/>
- Sentinel-2 Mission (Copernicus Programme): <https://www.copernicus.eu/>
- Agroplanning Agricultura Inteligente S.L. (Agroplanning): www.agroplanning.com
- University of Seville - Smart Biosystems Laboratory: <https://smartbiosystemlab.com/>

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/>

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