



**Practice Abstract 23 -
An AI-Powered Decision Support Tool for Sustainable
Irrigation and Field Management in Almond Farming
(GAIA OC SIP)**

23. An AI-Powered Decision Support Tool for Sustainable Irrigation and Field Management in Almond Farming (GAIA OC SIP)

Short Summary for Practitioners in English

Problem:

Almond farming in Spain is under growing pressure from water scarcity, irregular rainfall, heat events and rising production costs. At farm level, useful information is often available but fragmented across soil probes, weather services, satellite images, irrigation records and farmers' own experience. This makes it difficult to obtain a timely view of crop status, detect water-stress situations and decide when, where and how much to irrigate.

Solution:

GAIA is an AI-supported Agricultural Digital Solution tested on an almond farm in Salamanca, Spain. Instead of requiring the farmer to compare separate sensor readings, weather forecasts, satellite indicators and records manually, GAIA combines them into one irrigation-oriented workflow. Its AI analyses soil moisture, weather, rainfall expectations, field context and Earth Observation indicators to produce concise, parcel-level recommendations with an explanation of the main factors considered. The farmer remains in control and can confirm, adjust or reject each recommendation. A conversational interface also allows users to request field summaries and irrigation guidance in plain language.

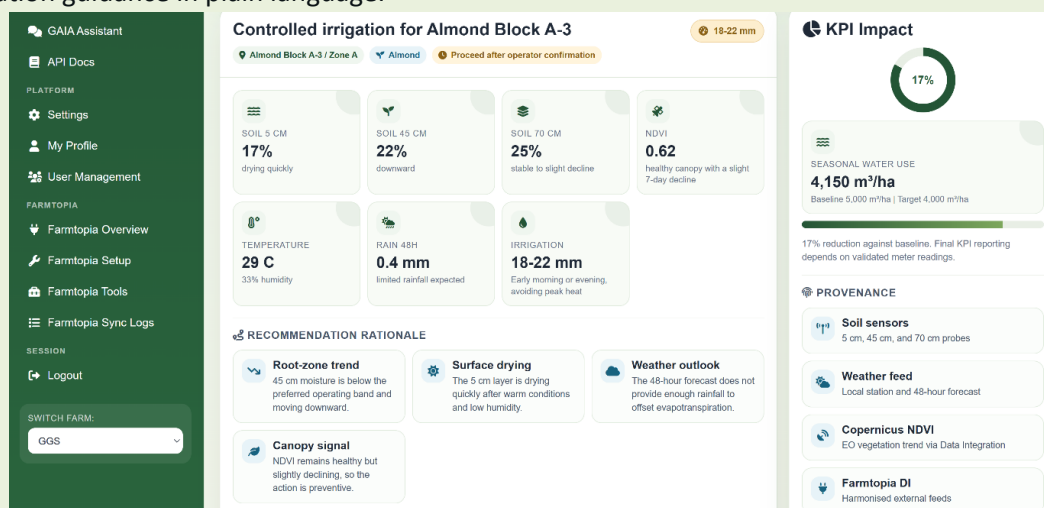


Figure The GAIA Platform

Practical Recommendations:

GAIA was co-created by Xilbi Sistemas de Informacion SL and almond farmer Gregorio Garcia Sanchez, configured around the farm's existing sensors and irrigation practices, and demonstrated in the operational plantation. For effective day-to-day use, sensors and water meters should be correctly installed, mapped to the relevant parcels and periodically checked or calibrated. Irrigation events and field observations should also be recorded consistently. Farmers should review the recommendation rationale, current weather and field conditions before acting, using the AI as decision support rather than automatic control.

Benefits:

- Water use decreased from 5,000 to 3,920 m³/ha, saving 1,080 m³/ha or 21.6%.
- Operational costs decreased from €1,650 to €1,375/ha, saving €275/ha or 16.7%.
- The fertiliser-loss-risk proxy decreased from 170 to 114 kg N/ha, an estimated reduction of 32.9%.

-AI recommendations add value by replacing fragmented manual comparisons with timely, explainable guidance based on several data sources.
-The farmer obtains faster access to relevant information, clearer parcel-level priorities and retains control over the final irrigation decision.

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/>

Xilbi Sistemas de Informacion SL: As part of the
Website: <https://xilbi.com>

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