

## Monitoring Olive Groves with Low-Cost Sensors: Phenological and Productive Approaches

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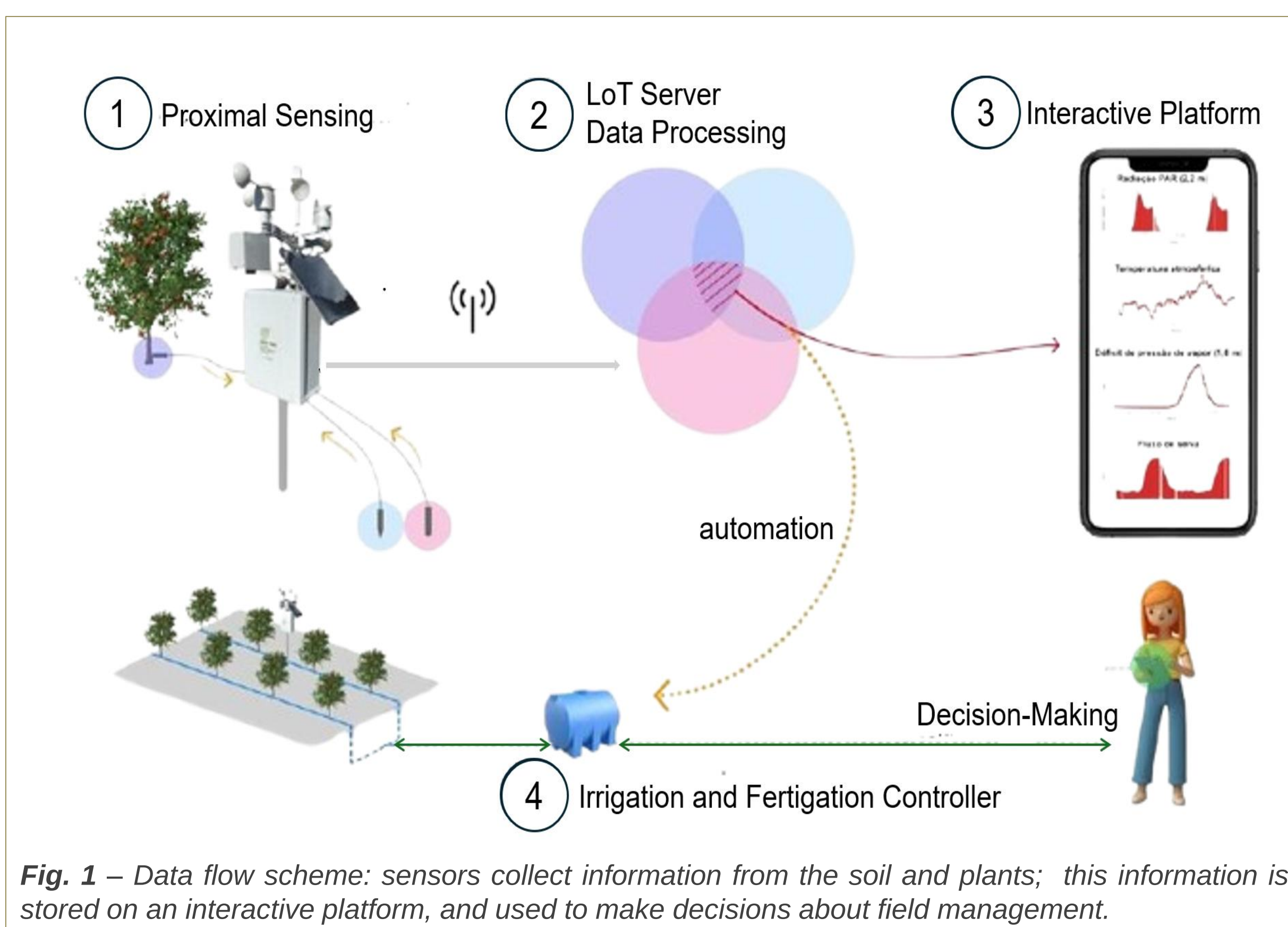
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### INTRODUCTION

The project “**TID4AGRO — Advanced, Innovative, and Digital Technologies for the Agroindustrial Sector in EUROACE**” aims to enhance the competitiveness and sustainability of the agri-food sector in the EUROACE region through the integration of innovative digital technologies.

Throughout the TID4AGRO project we are exploring the use of low-cost sensors for monitoring the reproductive and vegetative cycles of olive trees, with a focus on optimizing agricultural practices (Fig. 1).



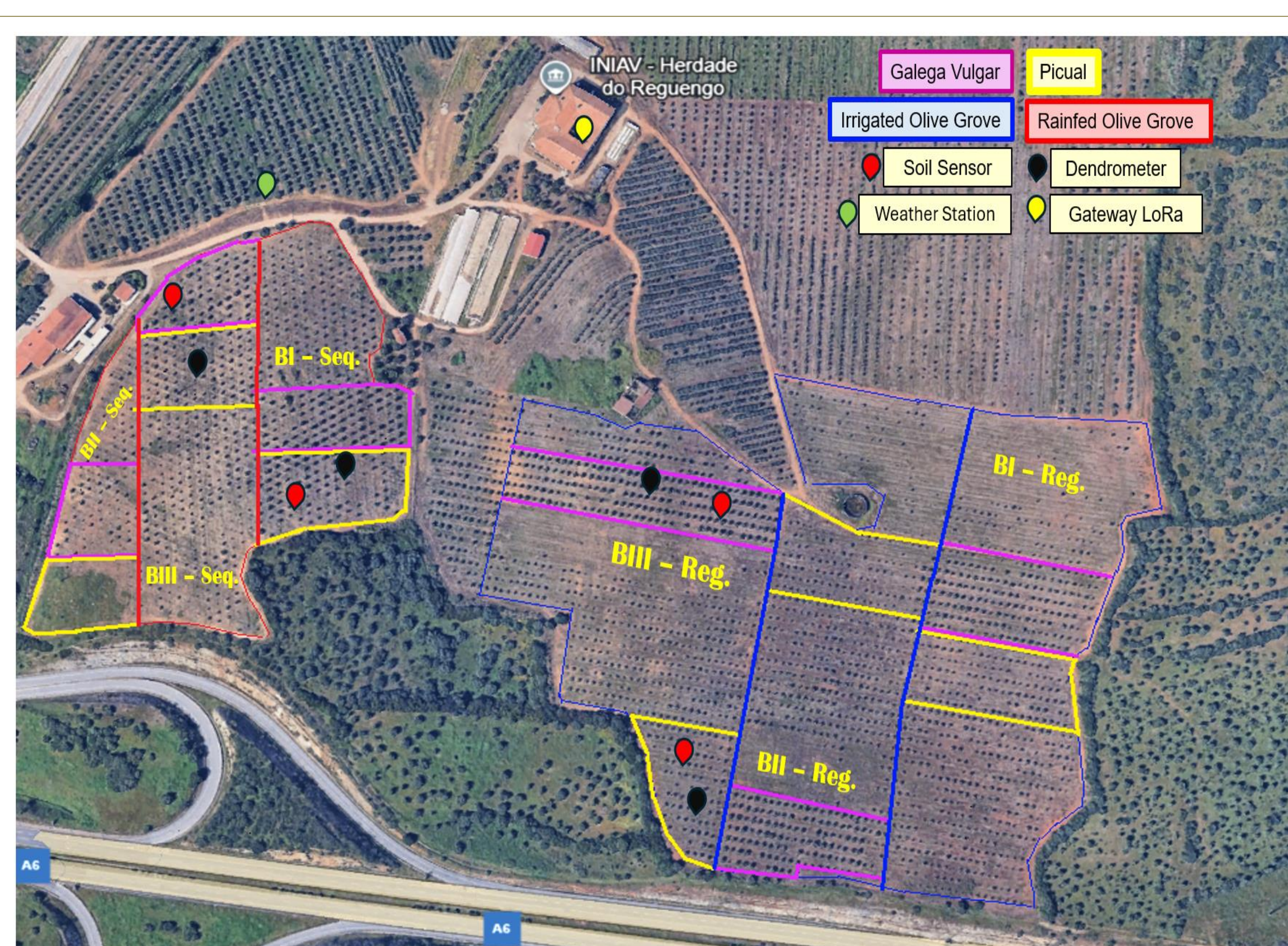
**Fig. 1** – Data flow scheme: sensors collect information from the soil and plants; this information is stored on an interactive platform, and used to make decisions about field management.

### MATERIALS AND METHODS

This study is being conducted in an intensive olive production system (‘Picual’ and ‘Galega Vulgar’) under both rainfed and irrigated conditions (Fig. 2). Flowering development was described using the BBCH scale (Sanz-Cortés et al., 2002), and fruit maturation was described using the stages outlined by Frías et al. (1991). Phenological development was recorded using the methodology described by Fernández-Escobar & Rallo (1981). Agronomic monitoring included evaluation of vegetative growth (del Río et al. 2005), and production parameters (e.g. fruit yield and % oil in dry matter). Low-cost sensors have been installed to measure the soil moisture and temperature, as well as air humidity, temperature, and precipitation. Plant sensors (dendrometers and sap flow meters) have also been installed to measure the vegetative growth and fruit development.

### FUNDING

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**Fig. 2** - Location of the experimental plots in Elvas, showing the olive grove areas delineated by the two varieties (‘Picual’ and ‘Galega Vulgar’), as well as rainfed and irrigated areas and the locations of the sensors, weather station, and LoRa gateway.

### EXPECTED RESULTS

1. Low-cost sensor-based identification of critical phenological stages (e.g. flowering, fruit set, and maturation).
2. Low-cost technological tools to develop more efficient agricultural practices, including irrigation, fertilization, and phytosanitary management.
3. Supporting data-driven decision-making to enhance the profitability of olive orchards while promoting environmental sustainability.

### References

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