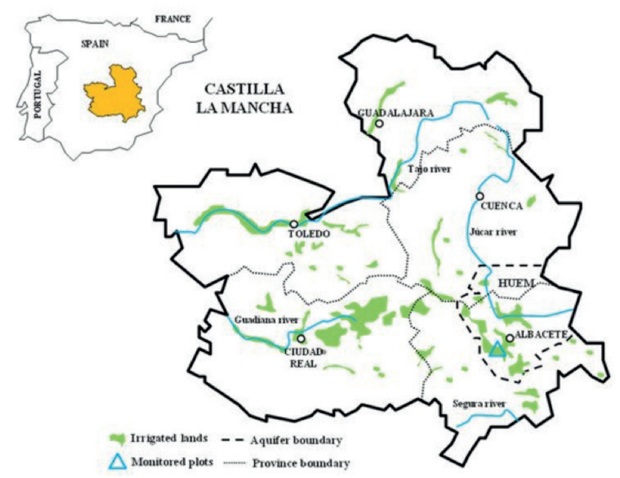
Demonstration site factsheet

Castilla La Mancha – Spain

Description

- The demo site includes twelve farms located over the Hydrogeological Unit "Eastern Mancha" (HUEM), which occupies an area of 7,260 km2 and supplies water to more than 120,000 ha of irrigated lands.
- In this area, 95% of irrigation systems are pressurized (mainly sprinkler and surface drip), with an average annual water allocation of 4,000 m3 ha-1.
- The most common crops in the area are grapevines, cereals (mainly barley, wheat and maize), garlic, onions, and other crops such as sunflowers and potatoes.
- The management of the water resources in the area is carried out by the Central Irrigation Board (an irrigation association) together with the Júcar Hydrographic Confederation and the Regional Agriculture Government.



Specific problems

- **Imbalance between water supply and demand,** with significant problems of water scarcity and where more than 90% of the used water is groundwater, which is associated with high energy consumption.
- **Poor animal production system:** low herd productivity, degradation of grazing pastures, poor feed management and nutritional problems, poor crop–livestock integration, young farmers' unwillingness to continue in this system.
- **Decrease of agricultural profitability:** the low availability of irrigation water, in combination with low sale prices and high inputs costs are decreasing the profitability of the farms. The main consequence is young people leaving rural areas.

Drought forecast 2021-2050 Albacete, Spain

- Positive SPI values are indicating drought severity

Methodology

- During the first year 2019-2020, several plots were monitored which corresponded to each studied crop. One plot of the best-trained and highest producing farmers was selected and divided in two parts to make a comparison between SUPROMED (SUP) research team and LEADER (LEA) management. Another group of farmers was selected which is AVERAGE farmers (AVE) this group has a training level and a way of managing of farms representative of the area.
- In the second year 2020-2021, some LEA farmers used SUPROMED tools (MOPECO irrigation scheduling tool, MOPECO crop distribution, PRESSUD, DOPIR and DOPIR- Solar tools, Weather forecast and agroclimatic zones based on remote sensing) to manage the plot and compare these results with the previous year. To monitor the real amount of water applied in each irrigation event and the evolution of soil moisture, a pressure transducer and a soil moisture probe were installed at each plot in a representative area. In addition, weather stations were used to obtain the agrometeorological variables for the determination of the irrigation requirements following the FAO56 approach.
- **Evaluation of the irrigation system** and **soil analys** is were made to determine the performance of the irrigation system and soil properties in order to make a proper irrigation scheduling and fertilization plan .

Crop monitored

Annual crops: Barley, wheat, oats, alfalfa, garlic, maize

Tree crops: grapevine, almond, pistachio, olive

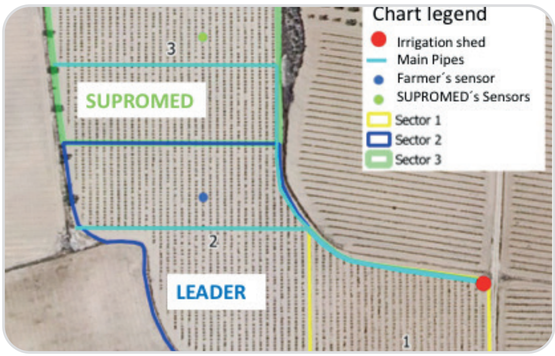
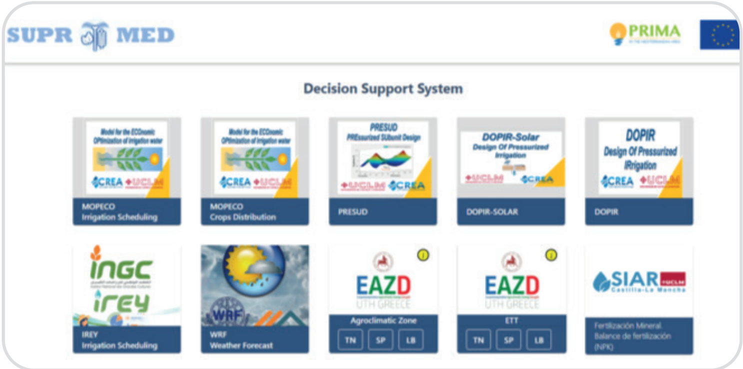


Figure 1 Demosite structure

Figure 2 weather station installed in an almond orchard

Important results

Using SUPROMED PLATFORM recommendations improved most of the Key Performance Indicators in relation to reducing the amount of irrigation water consumption, making a more efficient use of rainfall and reducing percolation. This fact, allowed to improve the agronomic and economic indicators, especially in crops with low profitability (i.e., barley, oats...) and reducing water footprint.



Yield (kg/ha)	13 %
Productivity of Gross Irrigation Water WPI (kg/m3)	22 %
Gross economic Irrigation Water Productivity GEWP(€/m3)	44 %
Nitrogen productivity (kg/kg)	29 %
Water Footprint WF (m3/kg)	-12 %
Gross Margin GM (€/ha)	25%

Table 1 : Castilla La Mancha average results for all monitored crops

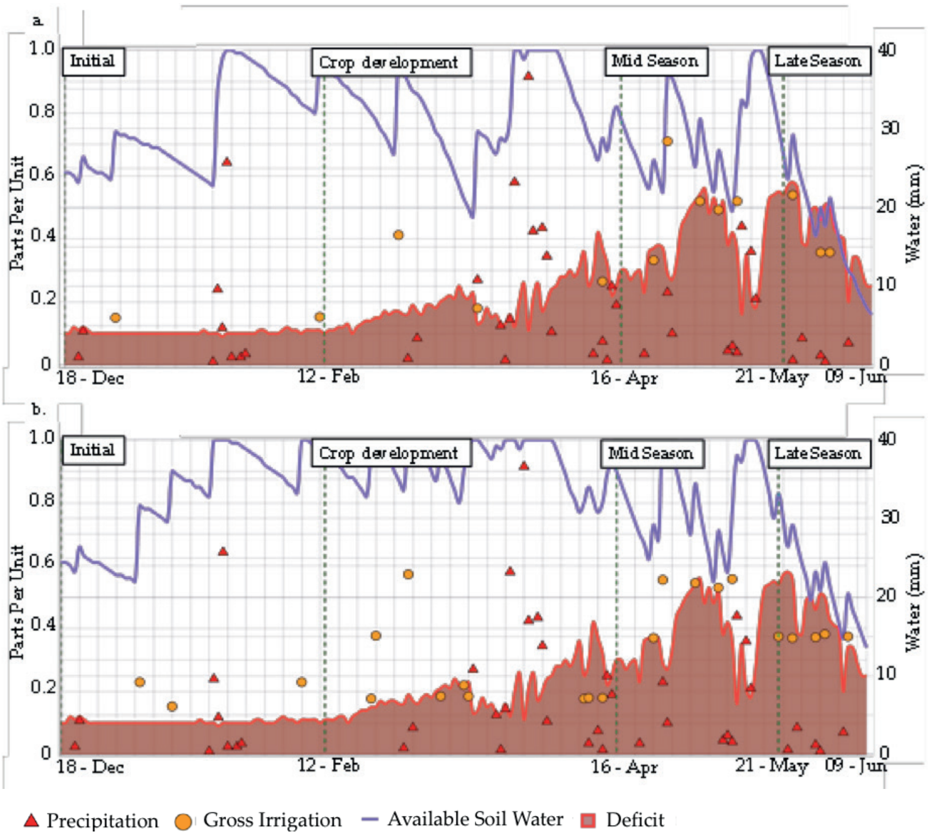


Figure 3: Example of MOPECO online irrigation scheduling tool for annual crops managed without water deficit.

- Figure 3 shows the comparison between SUP (1st diagram) and LEA (2nd diagram) management plans simulated by MOPECO model for a barley crop. The blue line (primary axis) represents the **available water (AW) in the soil**. It moves between wilting point (AW =0) and field capacity (AW=1). The red line represents the **allowable depletion level**. If the blue lines cross the red line the crop is under water stress conditions. On the other hand, if the blue line reaches and surpasses field capacity, it causes percolation.

- In figure 3 which is for barley crop during the first year, LEA farmer that supplied an excess of irrigation water, caused more percolation of rainfall and irrigation water. Both management plans obtained similar yields, but **SUP applied 32% less irrigation water**. Consequently, SUP obtained slightly lower costs and higher gross margin and economic indicators. The water footprint was lower because SUP management improved the use of rainfall.

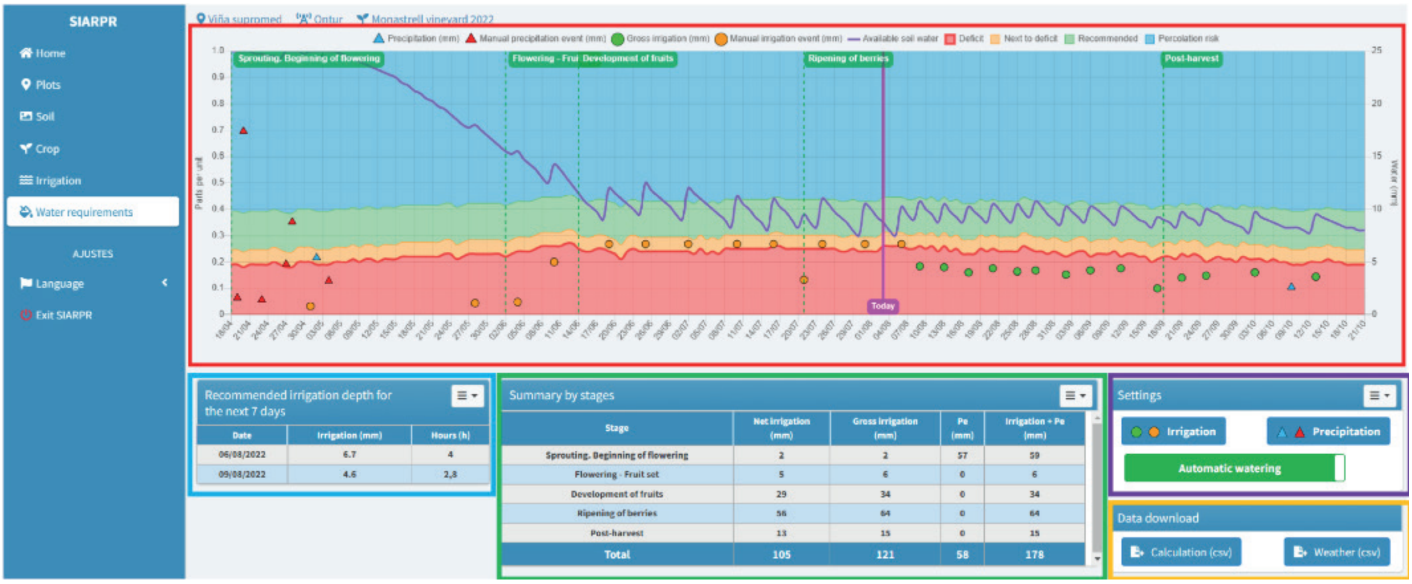


Figure 4. Example of MOPECO online irrigation scheduling tool for grapevines managed with RDI scheduling.

- Figure 4 shows the Regulated Deficit Irrigation (RDI) scheduling for a vineyard crop, using the MOPECO irrigation scheduling online tool offers a graph (red rectangle) with the following information:
  - **Vertical violet line:** Current crop cycle day.
  - **Purple line:** Simulated available soil water content evolution.
  - **Red line:** Lower limit of soil water content not to exceed the expected water stress.
  - **Orange dots:** Real irrigation events.
  - **Green dots:** Planned gross irrigation scheduling.
  - **Red triangles:** Manual precipitation data. (It can be modified in the violet rectangle).
  - **Blue triangles:** Automatic precipitation data from the nearest weather station .
  - **Green area:** Recommended soil water content area .
  - **Yellow area:** Area with soil water content near to water stress.
  - **Blue area:** soil water content area with percolation risk .

SUPROMED Website:
www.supromed.eu

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