LOCATION

Portugal

PARTNERS

INESCTEC

INIAV National Institute for Agrarian and Veterinary Research

ubiwhere SUITING THE FUTURE

FENADEGAS ADEGAS COOPERATIVAS DE PORTUGAL Grandes vinhos portugueses

3.2

Precision Farming for Mediterranean Woody Crops

CHALLENGE

Mediterranean Woody Crops have been severally affected by several challenges such as climate change (water scarcity), pests and diseases. Most of the farms specialising in these crops are small, low on profit and technology, and face high labour costs. Furthermore, Mediterranean Woody Crops owned by medium/small farmers have limited access to technology, due to the associated costs, and the low levels of systems interoperability. These farmers need simple, intuitive, and cost-effective technologies to help them overcome the challenges outlined and become more profitable by maximising the use of smart and precision agriculture.

AIM

This pilot aims at promoting technology, methods and IoT solutions to optimise precision farming practices of Mediterranean Woody Crops (Apple, Olive and Grape), considering the small farmers' economic constraints. The proposed solutions (IoT and Ground Robots) will enable a more efficient usage of inputs such as water, energy, macro-nutrients, and pesticides, thus increasing the profits of small farmers and reducing their environmental impact.

HOW

This pilot will promote the use of open-source, plug-and-play, cost-effective and modular technology that can be considered by small holder farmers. The pilot will demonstrate real-time monitoring and control of plants, water supply and nutrients, using IoT sensors and Agricultural Robots on the field for phenotyping. This will also enable precision-spraying and use satellite/aerial imagery for yield potential estimation.

BENEFIT

The implementation of standards-based and interoperable elements will facilitate the exploitation and maintenance of irrigation systems achieving greater efficiencies in water, nutrients and energy savings, with cost effective solutions that can be acquired by small holder farmers.

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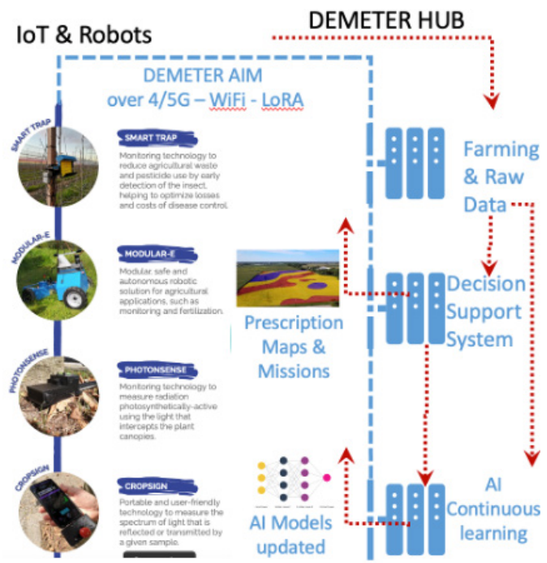
DEMETER Integration

On the Pilot 3.2, technology developers (INESC TEC and Ubiwhere) have developed and deployed technological solutions (hardware and software) that considers the Agriculture Information Data Model (AIM) on which DEMETER bases its interoperability. Advanced DEMETER enablers are virtualized, deployed and integrated in DEMETER infrastructure by means of the Access Control Enabler (ACS), DEMETER Enabler Hub (DEH) and Brokerage Service Environment (BSE). The results of the processed data are shown to the final user through the Adaptive Visualization Framework Hub (Knowage) and by NodeRed based viewer, that were accessed by end-users (INIAV and FENADEGAS)

Feedback From Farmers

Farmers have reported that the use of SmartTrap, CropSign, and PhotonSense is beneficial for managing crop treatments and reducing treatment costs. They suggest establishing a regional or national network of smart traps to detect diseases earlier, as many disease vectors tend to emerge in the vicinity of crops. However, farmers face challenges in adopting these technologies due to inadequate 4G/5G coverage and high prices. They seek solutions that provide concise information instead of overwhelming them with large amounts of complex data.



Outcomes

All the IoT devices developed, such as SmartTrap, Modular-E, PhotonSense, CropSign, and AgloT4Power, are equipped with smart modules or smartphones that have Edge-AI processing capabilities. This allows them to process the acquired information (raw data) locally and generate pre-processed data. In cases where the AI model exhibits uncertainty in estimation, the raw data is sent to the cloud to support the supervised learning of new Edge AI models.

Furthermore, the IoT devices have the ability to receive prescription maps, missions, or updated AI models from the cloud. These updates can come from Decision Support Systems and/or AI Continuous Learning systems, enabling local usage on the IoT devices. Implementing these IoT solutions has the potential to reduce pesticide usage by up to 30% and achieve earlier pest detection by 3 days.