PREC-WINE-FARM

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Prec-WINE-Farm: Sustainable Viticulture through Precision Agriculture

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INTRODUCTION & AIM

Viticulture in Samos Island, Greece, has unique characteristics due to diverse altitudes, slopes, and landscapes, impacting plant protection, yields, and wine quality. These conditions create challenges, especially for small holdings, which affect operating costs and viability [1]. Prec-WINE-Farm project was developed to implement precision agriculture applications adapted to the Samos wine sector. A key element of the project is an integrated, real-time Geographic Information System (GIS) accessible via internet and mobile devices, supporting viticultural activities. This system includes three main applications: (1) a plant protection module for monitoring the European grapevine moth, *Lobesia botrana* (Lepidoptera: Tortricidae) [2], populations, with potential expansion for bacterial and fungal disease monitoring and targeted spraying; (2) a production traceability system with input-output mapping; and (3) an information platform for producers providing real-time data on plant protection, harvesting, and other key activities. This initiative aims to improve the safety and quality of wines, optimise the cost of farm inputs and enhance the identity of Samos' certified wines.

METHOD

The Prec-WINE-Farm system integrates real-time data collection, spatial analysis and user-friendly mobile phone applications to improve the management of viticulture in Samos. The project developed three interconnected applications, each serving a separate purpose:

WebGIS | Prec-WINE-Farm

A webGIS that provides a visual interface for vineyard mapping, real-time monitoring, and decision-making support. Users can access detailed spatial data on vineyard locations, plant protection needs, and farm activities.
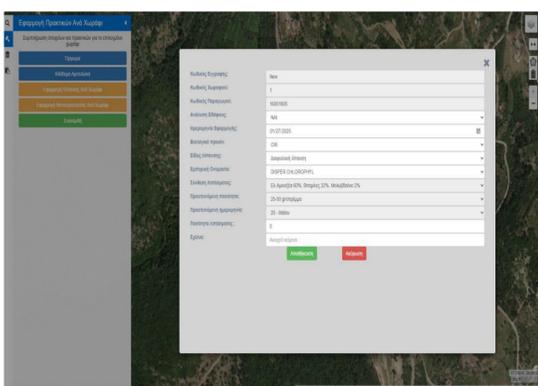

Figure 1 – Field Selection in WebGIS

Figure 2 – Practices recording by Field in WebGIS

1st Mobile Application | Prec-WINE-Farm

A mobile-friendly application allowing producers to record and track vineyard management activities. The system includes a plant protection module for monitoring *Lobesia botrana* (Lepidoptera: Tortricidae) populations. Data is stored in a central geospatial database, ensuring real-time accessibility.
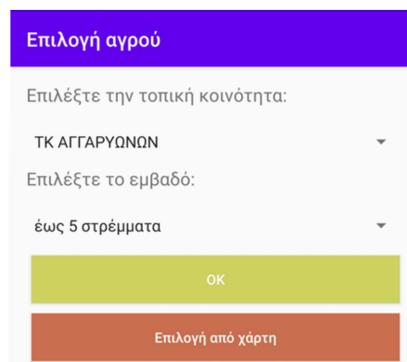

Figure 3 – Field Selection in App

Figure 4 – Practices recording by Field in App

2nd Mobile Application | Prec-WINE-Farm

A traceability app that incorporates QR codes to track the grape processing stages, from harvest to bottling. The system enhances wine uniqueness, transparency, and compliance with quality standards while also enabling real-time notifications to producers.

Figure 5 – Project overview

RESULTS & DISCUSSION

After the first year of implementation, there was seamless integration between mobile and web platforms. A key feature is dynamic data retrieval, ensuring that data is entered directly, easily, and securely by the producer either through WebGIS or the mobile application, as it is transferred directly to the geospatial database. However, the content of the application will need to be evaluated to ensure that it meets the needs of users. The plant protection module, which focuses on monitoring *Lobesia botrana* (Lepidoptera: Tortricidae) populations, has functioned effectively, providing valuable insights for targeted spraying. A suggested improvement for the data entry application is the inclusion of additional details for each production stage, such as quantity and origin information. These enhancements will improve usability and efficiency, ensuring that the system will fully support precision viticulture on the island of Samos.

CONCLUSION

The Prec-WINE-Farm system demonstrates the potential of precision agriculture in viticulture, integrating real-time monitoring, traceability and decision support tools. Through the WebGIS platform and mobile phone applications, it enhances pest management, production traceability and vineyard operations, contributing to the sustainability and quality of Samos wines. Utilizing geospatial data and producer feedback, Prec-WINE-Farm aims to support a more efficient and data-driven wine sector on the island.

AKNOWLEDGEMENTS

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