APPVID – Grapevine diseases management

EAFRD-funded projects

A collaborative system of precision viticulture enabling farmers to have online real time information about the health of the vineyards and make more targeted phytosanitary interventions.

SPAIN

Innovation & cooperation

Location
Rioja Alavesa

Programming period
2014 - 2020

Priority
P1 – Knowledge transfer & innovation

Measure
M – 16 Cooperation

Funding (EUR)
Total budget 266 088.92
EAFRD 171 408.82
National/regional 42 852.20
Private 51 827.90

Project duration
2016 – 2018

Project promoter
Asociación de Bodegas de Rioja Alavesa

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Summary

The control of grapevine diseases is traditionally carried out with phytosanitary treatments either applied at specific times every year, or based on the phenological state of the crop, without taking into account the environmental parameters that affect the disease.

The project aims to develop a collaborative system of precision viticulture. Small wineries and vine growers will have a real time on-line tool that will help them make decisions regarding the management of diseases. The remote sensors and mobile App will provide beneficiaries detailed information about the vineyards health in real time, thus facilitating the planning of phytosanitary treatments.

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Results

- Improvement farm profitability of farms due to the reduction of costs involved.
- Reduced environmental impact of due to the reduced and more accurate phytosanitary treatments.
- Improvement grapes quality. Grapes are healthier and with less phytosanitary residues, which affects positively the fermentation process.

Lessons & Recommendations

- ❑ It is key to establish trust between partners. Transparent management and joint decision-making are the main tools for achieving this.
- ❑ Farmers and all other end users of such tools must participate in the design process. It is the only way to foster a sense of ownership among the beneficiaries of the tool.

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Context

The winemakers of Álava area, Spain, were aware that a change was necessary in the way grapevine diseases are treated. Mildew, powdery mildew and botrytis, etc., are traditionally controlled with phytosanitary treatments which are repeated systematically throughout the season. Usually the treatment is applied at specific times of the year, or according to the phenological state of the crop, without however considering the environmental parameters that condition the development of the disease. The optimization of the use of phytosanitary products is a complex process since different variables must be taken into account, including weather conditions, grape variety, planting pattern, plot location or cultural practices, etc.

At the same time, Álava is characterized by small wineries with scattered farms, which complicates even further the decision-making process of the growers regarding when to apply treatments since it is not possible to carry out a homogeneous management of the vineyard. Overall, they needed a more sustainable and efficient use of phytosanitary products as it is required by legislation and because it can help reduce costs and improve the quality of the grapes..

Objectives

The objective of the project is to develop an easy-to-use system to monitor the health of the vineyards and inform/guide winegrowers on the optimal timing of treatment for control-disease in each plot.

Activities

The project began in December 2016 and will be completed in December 2018. Throughout 2017 the system will be developed and the first tests will be carried out. In 2018 definitive tests will be adjusted and tested.

Given the farm structure in the area, a collaborative use of precision farming tools seems to be the most efficient approach. The basic tool will be a mobile application that will analyze data provided by meteorological sensors implanted in certain selected plots (characteristics of each farming plot will also be available). The App will indicate to the grower the risk of occurrence of the different diseases in each one of the farms. Once the risk of illness is known, the grower can apply a treatment, if necessary.

The challenge to develop this project is twofold:

- **Collaborative:** Wineries / wine growers are used to manage their own farms, and the cooperation among them hasn´t been sufficiently stimulated in the past. In order to monitor all fields they would have to have sensors in each plot, which is economically impossible. Collaborating among them, and putting each of their sensors available to the rest, creates a network of sensors that allows monitoring all plots.
- **Technological**: Develop a network of communications and unified management of all data (through Big Data, precision farming and artificial intelligence), makes available to the winegrower a mobile APP that reliably estimates the risk of disease and helps in the optimal application of phytosanitary products.

In a first phase the needs of the winegrowers were studied. To this end, farmers provided the necessary information about their farms, including:

- registering the plots: the location of the plots and characteristics (common to others or particular) of each farm.
- reviewing of each participating farmer´s “management notebooks”: get to know the treatments applied (kind and number) for each disease in previous campaigns.

Field sensors were installed at the plots to monitor the climatic parameters. As it was not possible to monitor all the plots, vine growers selected those plots most vulnerable to diseases. The weather data are transferred to a web server for processing. Throughout the project winemakers track the condition of each disease, and this data is also sent to the Web server.

The climatic and vineyard information are used to develop the estimation risk-of-disease model. Mathematical models commonly used to calculate disease risk in vineyards only use meteorological information in their calculations and are unreliable. This project takes advantage of relevant data related to the specific characteristics of the plot, management, plot history, etc., with the aim of improving these models and make them more suitable for decision making.

An innovative aspect of the project is that the sensors work in a network. The farmers with scattered plots will select the most sensitive ones to be monitored. In this way, a network of intelligent parcels will cover the entire region. The estimation of disease risk of a particular plot is not determined by the data of the station owned by the winegrower, but by the station closest to the plot in question. This station may have been incorporated into the system by another farmer. The project requires, therefore, the collaboration between the winegrowers, without which the project can´t work. Once the pilot project demonstrates the viability of the system, other wine growers will be able to join it.

Another important activity is the development of the computer architecture and communication flow systems to ensure the data arrives to the server.

Finally, the tool that will be mostly used is a mobile phone application. All the information collected by the web server in the previous phases is reordered and analyzed, in order to obtain answers regarding disease risks and treatment recommendations through the app. In addition the system will be able to introduce the treatments applied in the farmer´s "management notebooks" in a computerized way.

The project is led by the Association of Bodegas de Rioja Alavesa (ABRA). The association includes some of the wineries that participate in the project: Agricultural Labastida, Ostatu, Artuke, Eguren Vines and Gil Berzal. Another Project partner is the Cooperativa Agricultores y Ganaderos de Álava (AGA), which represents several winegrowers who sell the grapes to other wineries and Beldio Txakolina winery, GIP Txakoli of Álava. Three other technology partners were involved including the NEIKER-Basque Country Agricultural Research and Development Institute, which brings the agronomic knowledge; HAZI Fundazioa, which provides the necessary computer support; and the company AGER-Technology, specialized in the development of applications In the agricultural sector.

Main results

The project is in its initial phase and it is not possible to evaluate results, but it is expected that the system will allow the reduction of the number of phytosanitary treatments which will mean:

- An improvement in the profitability of farms due to the reduction of costs involved.
- A reduction of the environmental impact of the activity.
- Improvement of the quality of the grapes. Grapes are healthier and with less phytosanitary residues, which affects positively the fermentation process.

In addition, the creation of the Operational Group aims to generate a framework of trust and a work dynamic that will allow all partners involved addressing new challenges in the future.

Key lessons

The project is in the early stages of development, but some key factors have already been identified:

- It is necessary to establish a framework of trust between partners. Transparent management and joint decision-making is a key issue.
- Farmers, end users of the system, must participate in the design. It is the only way that they consider as own the final system obtained.