

Profitability of new technology application to achieve maximum irrigation efficiency in a pilot conventional and organic vineyard farm of 100 ha

Summary

In viticulture, for winemaking it is necessary a balance between yield and berry composition to achieve maximum revenues. The novelty and challenge of this OG suggests setting up a new integrated methodology based on using Geographic Information Systems, remote sensing and simulation models as well as irrigation. The objective is to facilitate irrigation management of a commercial vineyard and get the maximum water use efficiency. The integration has to consider criterias such as crop sensibility to water stress and as a whole should get a reasonable and efficient cost/profit.

Objectives

The main objective is to demonstrate how to solve the problem of managing irrigation in a large farm in an efficient and practical way. This solution includes the following sub-objectives:

- 1) Management control on crop water status for each irrigation sector.
- 2) Reduction on pesticide and fertilizer applications through making organic wine production, and analyzing the impact of this technique on water requirements.

Description of project activities

To reach this goal, it is used the following:

- 1) Most recent advances in new Technologies and knowledge related with irrigation scheduling, remote sensing and crop modeling.
- 2) Engineering improvements on the irrigation network throughout re-designing irrigation sectors using remote sensing to achieve homogeneous management zones. This should allow applying resources precisely and avoiding excess of nutrients and washable soils.

Final results and practical recommendations

One of the main determining factors of the agricultural production in the Mediterranean climate is the crop water status. Forecasts indicate irrigation will be a key parameter due to climate change. To choose the most adequate irrigation schedule in each moment is crucial to achieve the right yield and fruit quality. In wine grapes, it is necessary to control the level of water stress throughout the season to get high quality berries. Although controlling soil water content could be easier its outcome on yield and quality would not be as good, because the soil represents just an intermediate step. During the last years, significant advances in new technologies offer unprecedented opportunities for the improvement of water use efficiency. Unfortunately, most of the involved tools are difficult to apply at commercial level. To make these technologies more practical and feasible for real field conditions, it has been necessary to integrate the effects of different factors which interact in the crop responses (soil heterogeneity, climate, phenology, seasonal sensitivity to water stress, crop management, and variety). This proposal demonstrates that the use of new technologies (remote sensing, crop simulations, and automated irrigation scheduling) can improve field management efficiency and at the same time be economically profitable.

Conclusions

With precision irrigation, we saved 25% of water in comparison with previous years. Also, yield productivity and berry composition improved. The analysis of within-field spatial variability (using spectral vegetation indices obtained with satellite multispectral images) showed a significant reduction in the vegetative growth in the same irrigation sector from 2015 (when Variable Rate Irrigation was not applied) to 2017.

This technology will benefit winegrowers by increasing water-use efficiency, and improving yield and berry composition.

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Keyword-category

Agricultural production system

Water management

Territorial scope

Province

Lleida

County

Segrià

Project dissemination *(publications, seminars, multimedia...)*

Ponències a jornades de transferència

Ponència en una Jornada científic-tècnica de teledetcció aplicada a l'agricultura i un curs internacional de reg

Presentació d'un pòster a l'AGRI INNOVATION SUMMIT 2017, Portugal

Un article tècnic divulgatiu

Pàgina web del projecte

Other project information

Projecte period

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Basic regulation: Ordre ARP/258/2015, de 17 d'agost, per la qual s'aproven les bases reguladores dels ajuts a la cooperació per a la innovació a través del foment de la creació de grups operatius de l'Associació Europea per a la Innovació en matèria de productivitat i sostenibilitat agrícoles i la realització de projectes pilot innovadors per part d'aquests grups, i es convoquen els corresponents a 2015.

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