

AGRICULTURE 4.0 AND RURAL DEVELOPMENT

Precision farming



Parallel Thematic Session

AGRICULTURE 4.0 AND RURAL DEVELOPMENT

Precision farming

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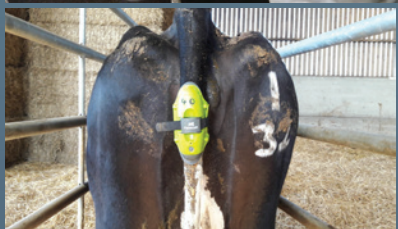
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Supported by:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°696367



Start: March/2016
End: February/2019

Budget: 2.105.796 €

Horizon 2020:

4D4F: Data Driven Dairy Decisions for Farmers

Practical problem

How to best use data to make real time decisions on dairy farms which result in improved farm sustainability, and improved welfare for both animals and farmers.

Partners

Names:

Innovation for Agriculture (UK), Institute for Agriculture and Fisheries Research (BE), Estonian University of life Science (EE), LIBA (BE), Wim Govaerts and Co Cvba (BE), Latvian Academy of Science (LV), University of Agronomic Sciences and Veterinary Medicine of Bucharest (RO), Knowledge Innovation Market (ES), The Royal Swedish Academy of Agriculture and Forestry (SE), Zuidelijke Land en Tuinbouw Organisatie (NL), Van Hall Larenstein University of Applied Science (NL), Paragon Europe (MT), Institute for Food and Agricultural Research and Technology (ES), KU Leuven (NL), DeLaval International AB, (SE)

Project

Objectives:

The 4D4F thematic network is focused on developing a network for dairy farmers, dairy sensor technology suppliers, data companies, agricultural advisors and researchers, to explore ways to use data generated by dairy sensors to support improved decision making by dairy farmers.

Expected results:

Create a community of practice to share, debate, disseminate and support the implementation of innovative approaches to dairy management. Develop Standard Operating Procedures which can be integrated into the decision making process on farm. Link to relevant EIP operational groups. Collate all available systems in a Warehouse of Technology.

Results so far/first lessons:

The website WWW.4D4F.EU gives free access to: Best Practice Guides in 12 different Special Interest Groups, videos, case studies, infographics, details of available technology, and a forum that facilitates interaction. Bringing all relevant information to one place helps farmers make the correct investment decisions. Annual research priority reports identify gaps for future research.

Who will benefit:

Dairy farmers, Veterinarians, Agricultural advisors, Technology companies, Researchers, Investors



Contact: Richard Lloyd
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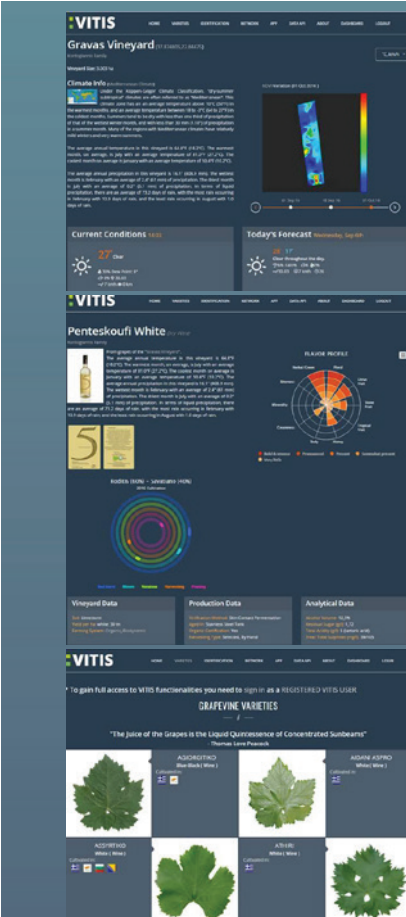


PRECISION FARMING



Supported by:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 644564



Start: January/2015
End: December/2017

Budget: 4.984.238 €

Horizon 2020:

BigDataEurope - Integrating Big Data, Software and Communities for Addressing Europe's Societal Challenges

Practical problem

Creating and linking information is a problem in every major area of agricultural research and in agriculture in general. This is especially important in viticulture where different research methodologies produce a great amount of heterogeneous data from diverse sources.

Partners

Names:

Semantic Web Company (AT); TenForce (BE); ERCIM / W3C (FR); Fraunhofer IAIS (DE); InfAI – Institute for Applied Informatics (DE); University of Bonn (DE); National and Kapodistrian University of Athens (GR); NCSR – National Center for Scientific Research – Institute of Informatics and Telecommunications (GR); CRES – Center for Renewable Energy Sources and Saving (GR); Agroknow (GR); CERTH – Centre for Research and Technology Hellas (GR); FAO – Food and Agriculture Organization of the United Nations (IT); VU University Amsterdam (NL); CESSDA – Consortium of European Social Science Data Archives (NO); EU SatCen – European Union Satellite Centre (ES); Open PHACTS (UK)

Project

Objectives:

BigDataEurope provides support mechanisms for all major aspects of a data value chain. The objective of the "Food and farming" Pilot is to demonstrate the ability of Big Data technologies to complement existing systems with efficient large-scale back-end processing workflows handling a variety of data types.

Expected results:

BigDataEurope aims to provide an adaptable, easy to deploy and use solution, which will allow interested user groups and stakeholders from different thematic topics (addressing Europe's Societal Challenges) to extend their Big Data solutions or introduce Big Data technology to their business processes

Results so far/first lessons:

For the "Food and farming" Pilot, the inclusion of different types of data complemented the existing pilot demonstrator (<http://vitis.agroknow.com/>) knowledge base. This helps to support complex real-life research questions, based on the correlation of environmental conditions with real observations on grapes production and quality, providing integrated solutions to the emerging problems in the European vineyards.

Website: <https://www.big-data-europe.eu/food/>

Who will benefit:

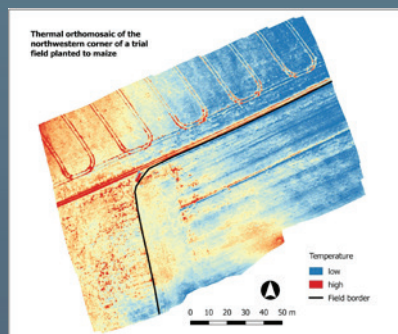
Stakeholders covering all spectrum of the agri-food ecosystem such as researchers, policy makers and agronomists.



Supported by:



EUROPÄISCHE UNION
Europäischer Landwirtschaftsfonds
für die Entwicklung des
ländlichen Raums



Start: 08/04/2016
End: 31/12/2019

Budget: 916.121 €

Operational Group:

Control of additional water use in crop production - situational, site-specific and automated (Precision Irrigation)

Steuerung des Zusatzwassereinsatzes in der Pflanzenproduktion – Situativ, teilsschlagspezifisch und automatisiert

Practical

problem

In the federal state of Brandenburg (Germany), irrigation of arable land is a measure to maintain agricultural value despite decreasing summer rainfalls. To avoid over-using the available water resources, however, a precise irrigation control needs to be developed and tested under local conditions.

Partners

Type:

Research Institute

Farms

Private companies

Professional association

Name:

Forschungsinstitut für Bergbaufolgelandschaften e.V.

Grünhagen Ackerbau GmbH; Agrarbetrieb Altdöbern

Irrigama Projektgesellschaft Dr. Schörling & Partner; Hydro-Air international irrigation systems GmbH

Fachverband Bewässerungslandbau Mitteldeutschland

Project

Objectives:

Development of an economic solution for site-specific irrigation, which takes into account the actual water need of the crops. The potential of infrared thermography for precision irrigation control is evaluated in addition to traditional soil based approaches.

Expected results:

An existing model for steering irrigation is adapted to site-specific irrigation control. The model results are automatically transferred to the steering unit of centre pivots to help save labour resources. Since the steering approach is applied at farm scale and evaluated in cost-benefit analyses, we shall be able to develop a practical solution for precision irrigation for local farmers.

Results so far/first lessons:

Two existing center pivots were modified to enable the site-specific application of irrigation water. We derived soil-based irrigation management zones and controlled the timing and amount of irrigation water with an offline prototype of our steering model. Moreover, we acquired aerial images at the infrared spectrum to derive crop canopy temperatures and to calculate crop water stress indices.

Who will benefit:

Farmers, governmental and non-governmental institutions, scientists.

Contact: Beate Zimmermann
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Supported by:



Start: 01/09/2016
End: 31/03/2019

Budget: 199.949 €

Operational Group:

Data assimilation from soil-crop-climate sensor network in IRRINET DSS

Sensori e IRRINET: integrazione delle informazioni provenienti da reti di stazioni meteorologiche e sensori privati con il modello di bilancio idrico IRRINET

Practical problem

There is an increasing interest in the adoption of sensors to monitor the soil-plant-water system from growers and producer organizations. Nevertheless, data integration and accessibility, as well as a real benefit for farmers in terms of water savings are still missing.

Partners

Type:

State organisation

Research institutes

Farmers organisations

Name:

Consorzio di bonifica di secondo grado per il Canale Emiliano Romagnolo, Bologna

Centro Ricerche Produzioni Vegetali, Cesena; Università di Bologna

Azienda Agricola Sandri, Imola; APOFRUIT Italia – Soc. Coop. Agricola, Cesena; C.I.O. Consorzio Interregionale Ortofrutticoli S.c.a.r.l., Parma

Project

Objectives:

Integration of soil, crop and environmental sensors within the IRRINET regional DSS for irrigation management, which will allow farmers to benefit from an increased reliability of the monitored data and to automatize data integration and interactions in the IRRINET portal.

Expected results:

Integrated environmental data from private sensors and weather stations to the IRRINET DSS.
Creation of links between IRRINET and weather and soil sensors located in pilot farms.
Validation of the IRRINET irrigation scheduling advices based on the irrigation needs identified in farms.
Protocols for validation and integration in IRRINET of sensors data.

Results so far/first lessons:

Six farms with private sensors network already integrated into IRRINET dss. Protocols for data integration and validation is in testing and calibration phase. First year of field trials almost completed.

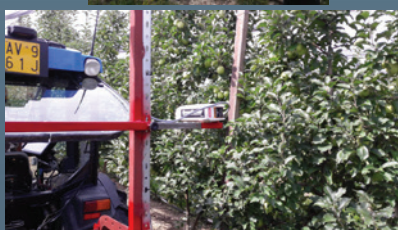
Who will benefit:

Farmers with irrigated crops in Emilia-Romagna Region.





Supported by:



Start: 01/01/2017
End: 31/12/2019

Budget: 297.378 €

Operational Group:

Evaluation of innovative agronomic strategy to improve precision in managing biotic and abiotic stress in fruit orchard

Valutazione e definizione di tecniche agronomiche innovative, mirate a ridurre fenomeni di lisciviazione di elementi minerali nel terreno e ad ottimizzare interventi di controllo di avversità biotiche e abiotiche in un eco-sistema frutticolo

Practical problem

Variability in fruit orchard is often very high. Extensive fruit farms operators are often trained to use high level of chemical inputs to correct trees deficiencies, without considering the orchard variability. Such management has high impact in costs and environment pollution.

Partners

Type:

Agricultural private companies

Research institute

Agri-food training organisation

Name:

Soc.agr. Mazzoni s.s.; Soc.Agr. Vivai mazzoni s.s.

HK-horticultural knowledge

Dinamica s.c. a r. l

Project

Objectives:

The objective is to better understand how to evaluate the potential yield in an orchard and to map it with a geo-statistical significance in order to connect it to biotic and/or abiotic trees stress, thus enabling to plan an agronomic strategy to avoid these stresses.

Expected results:

We expect to improve production levels, while reducing chemical inputs.

Results so far/first lessons:

We are still working on geo-referenced data with geo-statistical analysis to understand which is best suited to be used to create prescription maps and plan targeted interventions next year.

Who will benefit:

Fruit growers.

Contact: Michele Gerin
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PROGRAMA DE
DESENVOLVIMENTO
RURAL 2014-2020

Practical problem

Operational Group:

Increasing the viability of sown biodiverse pastures through optimization of phosphate fertilization.

Viabilização de pastagens semeadas biodiversas através da otimização da fertilização fosfatada.

Most Portuguese pastures are poor grasslands on degraded soils. Some farmers invest in improved and fertilized grasslands, namely sown biodiverse pastures, however their economic viability is threatened by production costs, namely phosphate fertilizers.

Partners

Type:

Agri enterprise
Research /Teaching
Agri Association
Agri enterprise

Name:

Terraprima – Serviços Ambientais, Sociedade Unipessoal Lda
Universidade de Évora; Instituto Superior de Agronomia
Associação dos Criadores de Bovinos da Raça Alentejana
Herdade dos Grous – Agricultura e Pecuária, Lda; Terraprima Sociedade Agrícola Lda; ZEA - Sociedade Agrícola Unipessoal, Lda; Tapada dos Números, Sociedade Agrícola, Lda; Sociedade Agrícola Herdade dos Padres, SA; Pedro Sacadura Teixeira Cabral Duarte da Silveira - Herdade do Azinhal
Fundação Eugénio de Almeida

Other company

Project

Objectives:

Optimize the use of fertilizers in sown biodiverse pastures by using remote data sensing for evaluating pasture nutrient needs and using Variable Rate Technology for fertilizer distribution.

Expected results:

Technological method for obtaining high-resolution phosphate fertilization prescription maps.
Obtain phosphate fertilization prescriptions in order to optimize pasture productivity and to reduce production costs.
Establish a service to farmers in improving the economic viability of sown biodiverse pasture.

Results so far/first lessons:

The first activities will be selection of experimental plots and obtaining satellite data. 3D terrain models will be obtained as well as soil measurements with optic sensors, capacitance sensors and electric conductivity sensors. Soil and plant samples will also be analysed. UAV flights will be performed, collecting multispectral images and correlating them with soil and vegetation measurements.

Who will benefit:

Farmers will benefit from optimizing pasture fertilization, improving its productivity and decreasing production costs.

Start: May/2017
End: December/2021

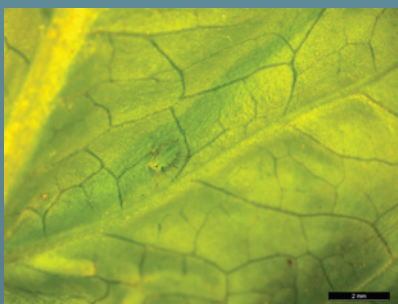
Budget: 503.033 €



Supported by:

European Agriculture Fund for the Development of Rural Areas: Europe invests here in rural areas with participation of the State of North Rhine-Westphalia.

Ministerium für Klimaschutz, Umwelt,
Landwirtschaft, Natur und Verbraucherschutz
des Landes Nordrhein-Westfalen



Start: 01/04/ 2017
End: 31/03/ 2020

Budget: 717.233 €

Operational Group:

High precision detection and spraying of aphids for optimization of lettuce production

Optimierung des Anbaus von Pflücksalaten mittels Präzisionserkennung und -applikation von Pflanzenschutzmitteln

Practical problem

Lettuce cultures are routinely pesticide-treated to avoid widespread infestation with aphids which are not tolerated by consumers. An automated identification of infestation events would allow for selective spraying which reduces the costs for pesticide treatments and levels of pesticide residues.

Partners

Type:

Research network

Research institutes

Marketing organiser

Farm

Name:

Competence Centre Horticulture (KOGA)

Research Center Jülich GmbH, Institute for plant sciences (IBG-2); Bonn University, Systems Engineering in Plant Production

Landgard Obst & Gemüse GmbH & Co. KG

Schwarz Gemüse und Erdbeeranbau

Project

Objectives:

The aim is to identify suitable sensors for the remote detection of aphid-infested lettuce plants and to develop an improved spraying device for small-scale application of pesticides. Both techniques will be combined in a tractor-borne setup for the selective spraying of aphid-infested lettuce plants.

Expected results:

We expect that the biotic stress response of lettuce plants to aphid infestation leads to altered spectral reflectance signatures. Suitable sensors will be selected to remotely detect aphid-infested plants. Furthermore, we will develop a custom designed spraying installation for individual plants by combination of high-precision valves and jets for small-scale application of pesticides.

Results so far/first lessons:

In a first experimental approach, lettuce plants with different infestation intensities of the polyphagous potato aphid (*Macrosiphum euphorbiae*) were cultivated to do comparative spectral reflectance measurements. Furthermore, a detailed study of lettuce morphology and growth patterns was basis for the establishment of a technical test facility to develop the spraying device.

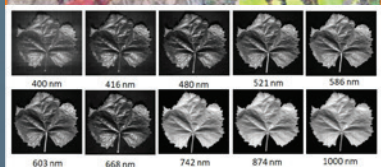
Who will benefit:

Farmers can reduce costs for pesticide treatments, and consumers benefit from products with lower pesticide residues.

Contact: Laura Verena Junker
E-mail: l.junker@fz-juelich.de



Supported by:



Start: January/2016
End: December/2018

Budget: 1.198.000 €

Colaborative Business R&TD Projects:

PARRA - Integrated platform for monitoring and evaluating vine health (automatic detection of flavescence dorée: work on cost optimisation of data collection etc.)

PARRA - Plataforma integrada de Monitorização e avaliação da saúde da vinha

Practical problem

A vineyard, one of the most important crops in Portugal, currently faces the threat of diseases with strong economical impact, like Flavescence Dorée. The early detection of this quarantine disease in large areas of vineyards, within a close time frame, will contribute to strongly reduce its impact.

Partners

Type:

Research/Teaching

Other Company

Name:

Instituto Nacional de Investigação Agrária e Veterinária, I.P.; Universidade de Trás-os-Montes e Alto Douro; Instituto Politécnico de Viana do Castelo

Agricultura, TEKEVER

Project

Objectives:

To develop a solution, exploring drones and other platforms, to collect vineyard data and develop automatic analysis algorithms to identify the presence of early stage symptoms of the Flavescence Dorée. The project will explore hyperspectral sensors and will evaluate its results in real scenarios.

Expected results:

To improve temporal responsiveness in disease detection and containment;
The reduction of operational costs of inspection and verification of vineyard grubbing actions and the reduction of production losses and yield of the vine due to this type of disease;
PARRA's approach also ensures the development of a scalable solution, both in terms of size and usage application by different stakeholders

Results so far/first lessons:

The Project has collected multiple vineyard samples, performed laboratorial analysis and collected hyperspectral data in order to characterise the symptoms; laboratory observation established the minimum number of samples; Symptoms variability due to climate and location of the disease; A samples collection protocol was developed to ensure proper handling of the bio and hyperspectral data.

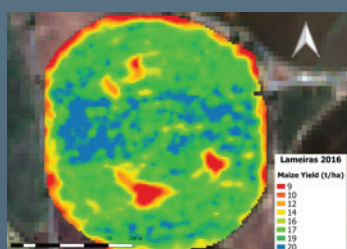
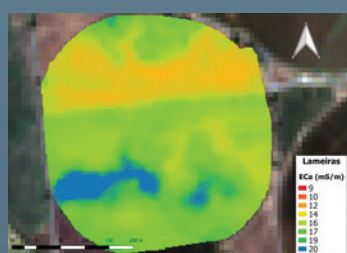
Who will benefit:

Vineyards producers;
Wine makers;
Agricultural enterprises;
Government agencies and laboratories;
Inspection agents

Contact: Nicole Cruz
E-mail: nicole.cruz@tekever.com



Supported by:



Start: April / 2014
End: December/2017

Budget: 220 000 €

PRODER:

SMARTCROP – Sustainable Competitiveness

SMARTCROP – Competitividade sustentável

Practical problem

The promoter, a maize producer in Vale do Tejo, seeks to implement a Smart agricultural production process based on the collection, compilation, treatment and data analysis, improving competitiveness with an agricultural intervention at the right time, in the right place, with the right amount.

Partners

Type:

Agri Enterprise
Research/Teaching
Agri Enterprise
Consultant

Name:

Quinta da Cholda
Instituto Superior de Agronomia
Hidrosoph
Consulai – Consultadoria Agro Industrial, Lda.

Project

Objectives :

Improve decision making process on farming management. Test and fit new technologies and equipment. Improve inputs and electric power efficiency. Integrate irrigation management with power meters. Identify critical points of gases emissions. Evaluate the cost/benefit of the new management system.

Expected results:

Application of new farm management tools to increase yields, reduce inputs and carbon emissions. Develop an online platform to support irrigation management and power usage.

Results so far/first lessons:

Integration of Precision Agriculture methods and technologies. Implementation of data communication system between different tractors terminal systems and head office computers. Creation of a new sustainability indicator dashboard. Improvement of Irristrat™ online platform and integration of a new module for the efficient use of energy

Who will benefit:

Farmers seeking to improve and rethink farm management in a more conscious way to apply inputs, water and power usage.



Contact: Bruno Caldeira
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PRECISION FARMING



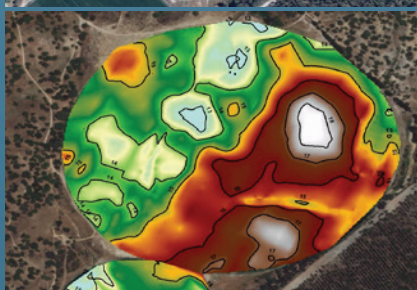
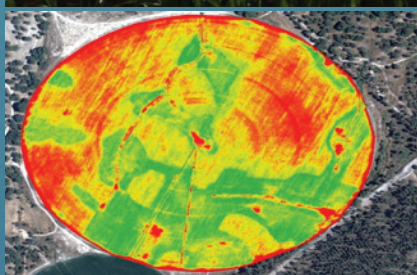
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DESENVOLVIMENTO
RURAL 2014-2020



UNION EUROPEAN
Fundo Europeu Agrícola
de Desenvolvimento Rural
A Europa investe nos seus campos



Start: September/ 2017
End: August/ 2021

Budget: 460.000 €



Operational Group: SMARTFARMING - Precision integrated system for irrigated farming efficiency and sustainability.

SMARTFARMING - Sistemas integrados de precisão para a eficiência e sustentabilidade da agricultura de regadio.

Practical problem

Precision Farming is getting common among the farmers, and they have now precise and valuable information about their crops (soil, crops and applied water/fertilizing) in each point of the field. How could we use this information, and low cost technology, on a precise irrigation of a pivot?

Partners

Type:

Other enterprise
Agri association
Farmer
Agri enterprise
Research/Teaching

Name:

TPRO Technologies Lda.
Associação de Beneficiários da Obra da Vigia
Maria do Carmo Afonso de Sousa Carvalho Pereira Palha
Muita Farinha - Actividades Agrícolas Lda. Pereira Palha – Agricultura, Lda.;
Raízes Verticais - Exploração Agrícola, Lda.
Universidade de Évora

Project

Objectives:

Gain competences on Variable Rate Irrigation, with clear benefits in the efficient use of resources, especially irrigation water, soil conservation and energy, regarding the maximum crop yield, ecosystem sustainability and competitiveness of agricultural sector.

Expected results:

Based on the integration of the different data collected from wide range of sources, it will be created a high-value precision output in each moment of the season. This way irrigation precision system will result on a decision support system controlled by a skilled specialist, uploaded to Variable Rate equipment in the field (implemented with minor investment on farmer's irrigation equipment).

Results so far/first lessons:

From our field experience on the last 4 years, we realized that the pivots irrigation is not efficient at all, due to its homogeneous water displacement on heterogeneous fields. There is starting to appear low-cost technology to technically solve the problem, but the farmers need to join the electronics to the agronomics, to know "how to" do it each moment of the season.

Who will benefit:

Farmers that are already using irrigation pivots and the ones that will be reconverted to irrigation and install new pivots.

Contact: João Noéme
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funded by



European
Commission

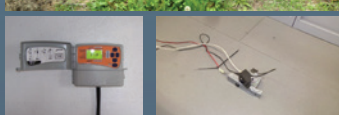
AGRI INNOVATION SUMMIT 2017

More information: www.aislisbon2017.com





Supported by:



Start: July/2017
End: June/2020

Budget: 973.610 €

Cooperation supported by FCT, I.P.:

WATER4EVER - Optimizing water use in agriculture to preserve soil and water resources

Practical Problem

Agriculture is the largest consumer of water and a key source of diffuse pollution, promoting eutrophication of water bodies, with associated biodiversity loss. Regulated Deficit Irrigation is part of the solution by decreasing water and nutrient surpluses, thus improving management practices.

Partners

Type:

Research/ Teaching

Other company
Agri enterprise

Name:

Instituto Superior Técnico (Portugal); Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência (Portugal); Universidad Politécnica de Cartagena (Spain); Institute for Agricultural and Earth moving Machines (Italy); Abant İzzet Baysal University (Turkey)
isardSAT (Spain)
DEIMOS Engenharia SA (Portugal)

Project

Objectives:

To establish a direct link between water quality and specific agricultural practices by combining EO, in-situ measuring, hydrological and crop models to develop tools for (i) supporting regulated deficit irrigation, and (ii) assessing the benefits for hydrological resources at the catchment scale.

Expected results:

The following results are expected: (1) to minimize diffuse agriculture pollution through improved irrigation management techniques; (2) to develop low cost sensors and new remote sensing approaches for plot scale monitoring; and (3) to develop models as interdisciplinary tools to optimize irrigation and fertilization practices and to link spatial and temporal scales

Results so far/first lessons:

The project is still in its initial phase. Consortium members already have all sensors and models necessary to set up the experiments, which will now be improved based on the partners' experiences and following a multidisciplinary approach.

Who will benefit:

Farmers, Agronomists, Water Agencies

Contact: Tiago Ramos
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