

Rice FertiSAT

Summary

Council Directive 91/676/EEC of 12 December concerning the protection of waters against pollution caused by nitrates from agricultural sources aims to reduce pollution caused by nitrates from agricultural sources and to take preventive action against further pollution of this kind. This Directive was transposed into Spanish law by Royal Decree 261/1996 of 16 February on the protection of waters against pollution caused by nitrates from agricultural sources.

In this regard, particular focus is needed on improving the efficiency of crop fertilisation. To this end, new technologies such as satellite imagery can be used as a tool to help improve fertilisation plans with a more accurate strategy of nitrogen fertilisation.

The Rice FertiSat project uses Sentinel 2 satellite imagery to map the NDVI spectrometry index of rice cultivation plots to the nitrogen requirements of the crop. To achieve this, the technology needs to be configured so that different NDVI values are correlated with the different vegetative stages of the crop and yields in an attempt to obtain optimal yields and maximum efficiency in the use and application of nitrogen fertilisation.

In addition, Sentinel 2 satellite imagery is now freely available throughout the crop cycle and NDVI can be easily obtained. The development and application of this technology would provide the Catalan rice production sector with an inexpensive and easy-to-implement tool for technical advisors in fertilisation while helping to meet the challenges of agricultural sustainability and competitiveness.

This project would be the decisive step in taking advantage of technological advances in remote sensing and spectrometry and would adapt this technology specifically to the area of rice cultivation.

This development would provide knowledge on how to map Sentinel 2 image information to the state of the rice crop and its nutrient requirements, thus enabling a more efficient and rational use of nitrogen fertilisers in rice cultivation. In addition, it would substantially simplify and improve the quality of fertilisation planning and objective decision-making.

Objectives

The aim of this project is to map the different NDVI values to an estimated crop yield according to the different rice varieties most commonly used in Catalonia.

With this information, an efficient and simple methodology could be established to improve fertilisation plans, increasing the efficiency of nitrogen fertiliser use and reducing unnecessary fertilisation and the amount of nitrates released into the environment.

Furthermore, this technology would increase the degree of objectivity of fertilisation plans with verifiable data and substantially facilitate decision-making when developing fertilisation plans.

Description of the actions carried out in the project

Work plan:

2023:

- Contact members of the monitoring committee and interested farmers
- Define functions of the Monitoring Committee
- Define the participation of the members of the Monitoring Committee
- Define the degree of participation of interested companies and farmers.
- Discussion within the Monitoring Committee regarding the implementation of trials and the interests of the Group.

January and February 2023:

- Dissemination of the project through websites and the media
- Search for fields aligned with the needs of the project
- Soil analyses
- Design of experiments

- Identification of necessary machinery and equipment

End of March, April and May 2023:

- Initial irrigation
- Sowing of the crop
- Data collection

April to October 2023:

- Crop growth and agronomic monitoring of trials
- Data collection
- Field day to show the state of the fields to the farmers (exchange of initial views with farmers and technicians)
- Mowing of plots

October 2022 to February 2024:

- Data processing
- Study of results
- Initial conclusions
- Day for transmitting initial results and conclusions

February 2024:

- Search for fields aligned with the needs of the project
- Soil analyses
- Design of experiments
- Identification of necessary machinery and equipment

End of March, April and May 2024

- Initial irrigation
- Sowing of the crop
- Data collection

April to October 2024

- Crop growth and agronomic monitoring of trials
- Data collection
- Field day to show the state of the fields to the farmers (exchange of views with farmers and technicians)
- Mowing of plots

October 2024

- Data processing
- Study of results
- Conclusions
- Day for transmitting and disseminating initial results and conclusions
- Communication plan

Final results and practical recommendations

With the publication of the results, a table will be published mapping the NDVI measured in different phenological stages between the end of tillering and the emergence of panicles (which is when a blanket fertilisation has the best effect) with an estimated crop yield and a recommendation of nitrogen fertilisation based on the variety used.

This data table is indispensable to be able to adjust nitrogen quantities and to design optimal fertilisation plans.

These results will be disseminated and made available to technical advisors, the Agricultural Fertilisation Office of the Ministry of Climate Action, Food and Rural Agenda and farmers.

Leader of the Operational Group

ORGANISATION: GENERAL COMMUNITY OF IRRIGATORS OF THE EBRO RIGHT BANK CANAL

Coordinator of the Operational Group

ORGANISATION: ASSOCIATION OF AGRICULTURAL PRODUCERS OF THE EBRO DELTA (PRODELTA)

Other members of the Operational Group (grant recipients)

ORGANISATION: ARROSSAIRES DEL DELTA DE L'EBRE I SECCIÓ DE CRÈDIT, SCCL

ORGANISATION: CÀMARA ARROSSERA DEL MONTSIÀ I SECCIÓ DE CRÈDIT, SCCL

ORGANISATION: EBRO AGRICULTURAL SYNDICATE COMMUNITY OF IRRIGATORS

Other members of the Operational Group (not recipients of the grant)

ORGANISATION: IRTA - Institute of Agrifood Research and Technology

ORGANISATION: EBRO DELTA RICE PLANT DEFENCE ASSOCIATION

ORGANISATION: PALS RICE PLANT DEFENCE ASSOCIATION

Subject area(s) of application

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and Climate Change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
Tarragona and Girona	Baix Ebre, Montsià and Pals

Dissemination of the project (publications, conferences, multimedia, etc.)

Dissemination plan:

- Press releases.
- Use of websites of group member entities.
- Field day 2023.
- Dissemination of the project, results and preliminary conclusions during the 2024 General Assembly of the Plant Defence Association.
- Day for disseminating results and conclusions of the 2024 Operational Group
- Preparation of tables of results and application models and conclusions of the project.
- Dissemination through the social media and websites of the group member entities.
- Involvement of different actors in the region.
- Monitoring Committee. The aim is to also involve the Land Service - Agricultural Fertilisation Office and the Territorial Services of the Ministry for Climate Action, Food and Rural Agenda in Terres de l'Ebre.

News published in the press:

- <https://setmanarilebre.cat/els-arrossaires-del-delta-de-lebre-podran-identificar-la-falta-de-nitrogen-als-camps-amb-imatges-de-satellit/>
- <https://www.diaridegirona.cat/economia/2022/05/26/els-arrossaires-catalans-podran-identificar-66560629.html>
- <https://www.aguaita.cat/noticia/25270/general/els-arrossaires-catalans-podran-identificar-la-falta-de-nitrogen-als-camps-amb-imatges-de-satellit>
- <https://www.imaginaradio.cat/els-arrossaires-del-delta-podran-identificar-la-falta-de-nitrogen-als-camps-amb-imatges-de-satellit/>

Publications on the websites of group member entities.

- <https://www.lacamara.es/ca/noticia/nou-grup-operatiu-sobre-fertilitzacio-sostenible-i-us-d%E2%80%99imatges-per-satel%C2%B7lit>
- <http://www.advdelta.cat/Fertilitzaci%C3%B3/>
- <https://www.arrossaires.com/ca/news/see/arrossaires-del-delta-de-l-ebre-i-seccio-de-credit-sccl-crea-un-grup-operatiu-sobre-fertilitzacio-sostenible-i-us-d-imatges-per-satel%2%b7lit--170>
- <https://www.comunitatregants.org/pagina.asp?id=839&i=ca&title=La-Comunitat-General-de-Regants-del-Canal-de-la-Dreta-de-l-Ebre-crea-un-grup-ope>

Project website

Websites of the beneficiary group member entities.

More information on the project

PROJECT DATES	TOTAL BUDGET	
Starting date: July 2021	Total budget:	€234,747.60
	DACC funding:	€108,559.69
Current status: Under way	EU funding:	€81,895.91
	Own funding:	€44,292.00

With funding from:

Project funded through Operation 16.01.01 (Cooperation for Innovation) through the Catalan Rural Development Programme 2014-2022.

Order ARP/113/2021 of 20 May, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ACC/1660/2021, of 27 May, announcing the call for the grant.



Generalitat de Catalunya
**Departament d'Agricultura,
Ramaderia, Pesca i Alimentació**



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de Desenvolupament Rural:**
Europa inverteix en les zones rurals