European Network for Rural Development

IRRINATE - IRRIFRAME
Sustainable irrigation management

EAFRD-funded projects

IRRIFRAME is an expert system for irrigation backed by the results of more than 50 years of research on plant/water relations and sustainable irrigation management.

ITALY

Restructuring and developing physical potential and promoting innovation

Location
Region & nation wide

Programming period
2007 - 2013

Axis / Priority
Axis 1 – Improving the environment and the countryside

Measure
M124 - Cooperation for development of new products, processes and technologies in the agriculture and food sector and in the forestry sector

Funding (EUR)
Total budget 134 000
National/Region. 140 000
Private 14 000

Project duration
2012 – 2014

Project promoter
Consorzio di Bonifica – CER and Associazione Nazionale Bonifiche Italiane (ANBI)

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Summary

Emilia-Romagna Region is a leading region for the Italian agricultural production with more than 84 000 farms and about 1 million hectares invested. About 33% of the regional farms include irrigated land. In this context it became more and more important to use the water in a more efficient way.

IRRINET - IRRIFRAME was developed as an "expert system" combining information from different databases such as SIRIUS, SIGRIAN and WEB GIS. The input required from the system are sources (meteorological, farm and GIS data), by mean of a sound knowledge base (water balance) and it makes the irrigation scheduling available on different communication channels. The system provides information on the best timing for irrigation, irrigation volume and economical advantage of irrigation. Moreover it provides a real-time irrigation scheduling, i.e. day-by-day information on how much and when to irrigate farm crops, etc.

Results

The IRRINET - IRRIFRAME service involves more than 40.000 farms, covering almost 40% of the irrigated area in the region.

Its application in the last RDP 2007-13 allowed a water saving for more than 50 millions m3 in the Emilia Romagna region.

In 2013, about 55 % of Italian irrigated land has been managed by IRRINET - IRRIFRAME saving about 100 million m3 per year.

In the first semester of 2014, 1 000 new users registered to the system.

Lessons & Recommendations

- ❑ This initiative was successful because it is a simple, user friendly, informative system that has been set up for farmers to decide when and how much to irrigate. This visual tool is accessible without charge and is tailored for a large number of crops.
- ❑ The platform has very low management costs which are supported by the local Water Board and the service is provided for free to the final users. The operating cost of the IRRINET - IRRIFRAME platform is around 0.02 €/ha for a whole irrigation season.
- ❑ IRRINET - IRRIFRAME can be easily transferred wherever the data to run the expert system are currently available. However, those parameters set up and validated in Italy might need to be locally calibrated or substituted.

Context

The Emilia-Romagna Region is a leader region for the Italian agricultural production with more than 84 000 farms and 1 064 214 hectares invested. About 33% of the regional farms include irrigated land. The most used irrigation system in the region is sprinkler (59% of the total irrigated area) followed by micro-irrigation (24%), furrow and border irrigation (12%), and submersion irrigation (3%) (ISTAT 2010). Fresh water is relatively abundant in the Emilia-Romagna region although changes in the geographical distribution of rainfall (ARPA 2010) have caused significant water deficit in some areas and episodes of water shortage are expected to increase in the future. Water is more abundant in the north-west side of the region (called Emilia), whereas in the south-east side (called Romagna) surface water has always been limited. This situation has been partly compensated by the construction (started in 1955) of an artificial canal conveying irrigation water called Canale Emiliano Romagnolo (CER). The water distributed to farms by land reclamation consortiums is therefore becoming an increasingly valuable and irreplaceable resource, to be used in an even more efficient than ever before. In this context was developed the IRRIFRAME (former IRRINET) Project with the implementation of a supporting tool for a scheduling expert water management.

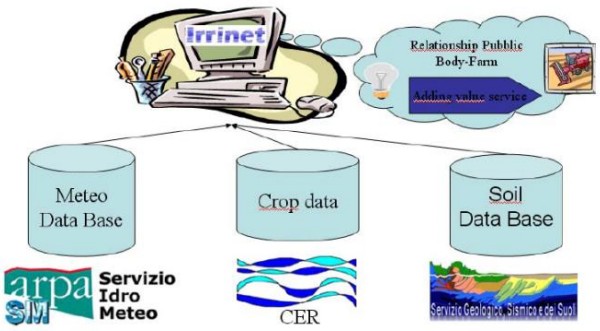
Objectives

Considering the recent drought events in Italy and in particular in some areas of Po valley, Regional Managing Authority has put pressure to improve water use efficiency, introducing on one hand new criteria regarding water resources governance and management by water authorities and agencies involved in this, and on the other, developing innovative techniques that may enable farmers to improve overall economic and sustainable production by adopting rigorous innovative techniques such as water scheduling.

A great effort on this matter has been made by this project (IRRINET - IRRIFRAME) which was supported and co-funded by the Emilia-Romagna Region and ANBI (National Association of Reclamation and Irrigation) in collaboration with CER (Canale Emiliano Romagnolo). The implementation of the project and software have been supported by the results of more than 50 years of research on plant/water relation and sustainable irrigation management. The tool have been used in the last 5 years from more than 30 000 users to help farmers to improve overall economic and sustainable production and using water in a more efficient way.

Activities

Since 1959 the CER Consortium has also been in charge of research on irrigation and providing technical assistance and training to farmers for the efficient use of irrigation water. The irrigation model has been developed by CER and has been validated locally over 30 years field trials. The main structure of the model is described in the figure below.



As shown above, the model considers the soil, plant, atmosphere continuum and it is based on water balance, where crop water requirement is calculated from evaporimetric data, corrected for crop coefficients (Kc) modulated according to local information, accounting for reduced water uptake by the crop due to water stress. Watertable depth data are also taken into account as water supply, in order to reduce crop irrigation needs.

IRRINET - IRRIFRAME is defined as an “expert system” because it combines information from different databases such as SIRIUS, SIGRIAN and WEB GIS. The input required from the system are sources (meteorological, farm and GIS data), by mean of a sound knowledge base (water balance) and it makes the irrigation scheduling available on different communication channels. And the output of the system are information on: best timing for irrigation, irrigation volume and economical advantage of irrigation. The system provides a real-time irrigation scheduling: day-by-day information on how much and when to irrigate farm crops. Actual data are gathered on daily basis in the Web DB server from several sources (meteo agencies, farms, agro-data networks). Irrigation scheduling is built by means of an irrigation model based on daily soil/plant/atmosphere water balance . Adding values of the system is IRRINET- IRRIFRAME SMS-Mobile - The same web information are automatically sent via SMS to farmers: most of them are registered into the system by technicians and do not need Internet connection to get the irrigation scheduling. The main functionalities of the platform can also be accessed by an APP for Android and IOS called “Irriframe Voice”.

Main Results

The IRRINET - IRRIFRAME project achieves the following objectives:

1. support farmers and provide irrigation advices for the main water demanding crops;
2. evaluate the existing water governance system in terms of its capacity to support irrigation water efficiency in the Consorzio di Bonifica per il Canale Emiliano Romagnolo (land reclamation consortium for the Canale Emiliano Romagnolo) district in the Emilia Romagna region, Italy;
3. identify context relevant institutional dynamics that could enable greater irrigation water efficiency.
4. demonstrates farm irrigation applied in case of official control, in order to obtain public funds for many EU/Regional sources (Rural 1). development programmes).

IRINET - IRRIFRAME service now involves more than 40 000 farms, covering almost 40 % of the irrigated area in the region. Its application in the last RDP 2007-13 allowed a water saving for more than 50 millions m3 in the Emilia Romagna region. As far as the technical point of view is concerned the development group is working both on a closer integration with open GIS information layers that may reduce the amount of data the users are requested to register in the system and the use of satellite information to determine the effective crop coefficients (Kc) for the water balance calculation. In 2013, about 55 % of Italian irrigated land has been managed by IRRINET - IRRIFRAME saving about 100 million m3 per year. In the first semester of 2014, 1 000 new users registered to the system.

Key lessons

Today, IRRINET - IRRIFRAME's awareness is very high in Italy and most of the farms involved with Best Practice Guidelines and/or Quality insurance use it daily. Interesting and unexpected was the fast implementation of the project from Regional to National level and the use of the system from the Italian Agricultural Ministry (MIPAAF) for planning of policies for agriculture in response to the Commission's observations about water savings (Water Directive Framework and in response to the requirements of the Guidelines for Water Protection).

Additionally, some regional Guidelines mention IRRINET - IRRIFRAME as a supporting tool to fulfil the water conditionality of the European Regional Development Fund regulation and respecting IRRINET-IRRIFRAME's irrigation scheduling is mandatory for many farmers.

Success factors:

- The key element which made this initiative successful is the simple, user friendly, informative system that has been set up for farmers to decide when and how much to irrigate. This visual tool is accessible without charge and is tailored for a large number of crops.
- The platform exhibits very low management costs which are supported by the local Water Board and the service is provided for free to the final users. The operating cost of the IRRINET - IRRIFRAME platform is around 0.02 €/ha for a whole irrigation season.
- IRRINET - IRRIFRAME can be easily transferred wherever the data to run the expert system are currently available. However, those parameters set up and validated in Italy might need to be locally calibrated or substituted.

Additional sources of information

n/a

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