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Water savings in Irrigation - Foreword

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FOREWORD

In Europe, 25% of freshwater withdrawals are consumed by agriculture and may even reach up to 80% in some Mediterranean regions where irrigation is essential for securing food production. Faced with climate change and the multiple demands on water resources, the challenges of water savings in agriculture are becoming increasingly evident. These challenges differ from country to country, and even from region to region, and are strongly linked to local pedoclimatic and agronomic characteristics.

Agricultural practices are regulated at the European level by public aid from the European Union.

Currently, the European Union is seeking to promote good practices, in particular the transition towards water-saving and environmentally friendly farming methods. For example, EAFRD (the European Agricultural Fund for Rural Development) supports investments in water-efficient irrigation equipment (European Regulation No. 1305/2013 - *Article 46, item 4*). Each EU Member State is, therefore, free to use any method it chooses to carry out an ex-ante evaluation of the water savings potentially achievable by changing irrigation equipment.

Water savings are directly related to water use efficiency, an indicator often used to express the level of performance of irrigation systems from the source to the plant. Global water use strategies focus on the need to increase water efficiency for agricultural purposes and to reduce water wastage in order to make water available for other more productive and strategic uses and the maintenance of environmental services. In this context, improving irrigation efficiency can achieve additional water savings. However, it should not be forgotten that such improvement is a slow and difficult process, which depends both on the local water scarcity situation and on management constraints (e.g. duration of the water cycle). This progress, which can be costly, requires a know-how and coordinated actions at different levels.

A Time for Discussion at European Level on Water Savings in Irrigation

In view of the complexity of the subject, the National Research Institute of Science and Technology for Environment and Agriculture (IRSTEA)¹, Montpellier SupAgro, the French Association for Water, Irrigation and Drainage (AFEID), the Association of Irrigators of the French Mediterranean Regions (AIRMF), the Occitanie Regional Chamber of Agriculture, the Provence-Alpes-Côte-d'Azur Regional Chamber of Agriculture and the Aqua-Valley cluster, jointly organised a European-wide conference entitled "Water Savings in Irrigation" held on 13 and 14 November 2019 in Montpellier. The conference focused on scientific and technical issues related to water savings made possible by changes in irrigation equipment and practices. The two days were aimed at actors in agricultural water management in Europe with the following objectives:

- to share information on the keys to saving water and improving irrigation efficiency,
- to share feedback on quantitative management,
- to share methodologies for ex-ante evaluation of water savings achieved by changing equipment or adopting management tools in the different countries of the European Union,
- to present technical innovations to save water in irrigation,
- to promote exchanges between the operational, institutional, technical and scientific actors.

The conference provided an opportunity to bring together a large number of irrigation experts from the European Union, from the operational, scientific and technical, institutional and political, or socio-economic fields, and in particular several operational groups of EIP (the European Innovation Partnership). About 50 speakers made presentations in a variety of dynamic formats, alternating personal accounts from farmers and local actors, scientific presentations, feedback, discussion and debate. Some 200 participants came from a variety of backgrounds: agriculture, state services, water agencies, technical and scientific institutes, educational establishments, companies, local authorities and management bodies.

Several factors of debate emerged in the course of the different sessions, which gave rise to various questions, discussions and the expression of different opinions on the issue of water savings in irrigation. The presentations were divided into different sections:

- Examples of methodologies used in Europe to assess water savings
- Feedback on specific work in EU countries
- Potential water savings by changing irrigation equipment
- Potential water savings through improved irrigation management
- Potential water savings through integrated approaches
- Scientific workshop
- Brief business presentations
- Concluding round table discussion.

1. Now INRAE, l'Institut national de recherche pour l'agriculture, l'alimentation et l'environnement (National Research Institute for Agriculture, Food and the Environment), which, since January 2020, has brought together the former organisations INRA and Irstea.

Outcome of the Conference

The discussion on potential water savings in irrigation is strategic in the context of climate change. This topic is currently being addressed on a variety of scales and is of central concern to all actors in agricultural water management. Consequently, this event generated various discussions and enabled some conclusions to be drawn:

Summary of Country Feedback

European experts reviewed the results. Their varied reports show that many attempts are being made to save water, both in countries with a long history of irrigation and in countries where the need for irrigation has recently arisen. These diverse and varied examples show that, on a European scale, water savings are possible through improving the overall efficiency of irrigation by combining technologies (infrastructure, delivery systems, planning tools) and practices that are more efficient.

Spotlight on Innovations

Several French and European private companies are developing water-saving innovations. This has resulted in a plethora of both technological and methodological solutions, enabling significant improvements in the performance of equipment and irrigation management tools. There is a need to showcase these options more effectively and to work on their complementarity to develop more intelligent and therefore more efficient irrigation in the face of the climate challenge.

Importance of Assessing the Impacts of Regulations on Water Savings

The discussions highlighted the lack of feedback on the impact on water consumption of regulations, in particular of measures linked to article 46 of European Regulation No. 1305/2013 (support for investment in water-saving irrigation equipment by EAFRD). There is a need to evaluate post-facto the impact of the regulations on the water savings achieved. In order to assess the relevance of water-saving policies, a harmonised methodology for measuring volumes consumed and production must be put in place to quantify water savings at the different levels (plot, network, catchment basin and aquifer) under the pressure of climate change.

Research Outlook

The scientific workshop, as well as several other contributions during the conference, highlighted the following points:

- The need to make continued efforts to evaluate irrigation performance, in particular, to achieve a better evaluation of water savings;
- The methodologies and indicators to be used: What spatial and temporal scale? How to quantify the rebound effects?
- The contributions of the new tools (sensors, connected objects, remote sensing, etc.);
- The need to take into account and incorporate elements other than water (soil, energy, work, environment, etc.);
- The need to rely on data from verified measurements and to communicate clearly and rigorously.

Activities for the improvement of irrigation materials and practices need to be pursued. To do so, it is essential to guide the work towards renewed research themes:

- Adaptation to extreme conditions linked to climate change (heatwaves, drought);
- Irrigation of new crops in certain specific contexts (vines, olive trees, etc.);
- Development of management tools (new sensors, models, use of big data, etc.);
- Integration of the different levels in the development of performance;
- Agro-ecological practices in irrigation.

Recent droughts and heatwaves have raised new questions and challenged some traditional concepts. Irrigation can be reconsidered not only as a means of compensating for crop evapotranspiration to produce biomass but also as a means of combating heat stress aggravated by dry air (spray irrigation), as a factor favouring the biological activity of the soil and as a complement to the natural ability of certain plants to adapt to water stress.

Networking of Multi-Stakeholder European Experts

The participants agreed that it was important to promote these interactive and multi-stakeholder exchanges and to maintain them regularly as they make it possible both to identify mutual needs and concerns (scientific, technical and regulatory) and, of course, to disseminate advances in terms of knowledge and innovation in the field of irrigation.

The "European Union" format of this network of experts is to be promoted in relation to the regulations and their implementation by the regions (Common Agricultural Policy, Rural Development Programme). The member States are all facing challenges related to climate change; in the South, they already have long-standing experience of irrigation, while in the North or East, they are dealing with hitherto unknown droughts. ■

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INRAE, UMR G-EAU, scientific coordinators of the issue

VIEWPOINT

Philippe LAMMENS (European Commission)

"It was my great pleasure to have opened this conference.

As manager of the Languedoc-Roussillon Rural Development Programme (RDP) at the European Commission's Directorate-General for Agriculture and Rural Development, I am conscious of the challenges that water management poses in this region. Therefore, when I was in Montpellier in June 2018 for a Monitoring Committee meeting, I took the opportunity to visit the ex-IRSTEA to find out what water management solutions research can offer. It was during this visit that the idea was born to organise a forum for sharing information and ideas at the European level on water savings in irrigation. In November 2018, there was a meeting of the First Steering Committee for this conference, followed by several other meetings.

The Committee's expectations of this conference were twofold:

- *Firstly, to engage in discussions on possible water savings in irrigation for the development of sustainable agriculture.*
- *In addition, to further stimulate the dissemination of results at the European level:*
 - *of research, and*
 - *technical innovations for water savings in irrigation.*

I was delighted that so many representatives of operational, institutional, technical and scientific stakeholders and many other speakers were able to participate, from 11 member States and even from outside the European Union (Turkey, Ukraine, etc.), as they enabled many fruitful exchanges and discussions. The dissemination of the results, which began at the conference itself, will be fully covered in this special issue of the INRAE journal Sciences, Eaux et Territoires."

CONFERENCE « WATER SAVINGS IN IRRIGATION » MONTPELLIER - 2019



Organisers



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