

# SUMMER SCHOOL

FIRST ANNOUNCEMENT

## DIGITAL WATER MANAGEMENT FOR SUSTAINABLE IRRIGATION

*Water is the "lifeblood"  
of agricultural practice,  
worldwide*



Jolanda di Savoia (FE)  
Cadriano (BO)  
Budrio (BO)



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DI PADOVA



## PURPOSE

To minimize the impact of drought, soil needs to capture the rainwater that falls on it, store as much of that water as possible for future plant use, and allow for plant roots to penetrate and proliferate. Problems with or constraints to one or several of these conditions cause soil moisture to be one of the main limiting factors for crop growth.

Recognizing the importance of irrigated agriculture to food security improved management strategies must be developed to improve water productivity within present farming systems. Under low and variable rainfall conditions, efficient soil moisture management is a good way to improve water use efficiency.

The question is how to optimize soil moisture and water use efficiency, which is a key parameter for drought-proofing the soil and increasing productivity in irrigated agriculture while protecting water resources.

In order to create a drought-resistant soil it is necessary to understand the most important factors influencing soil moisture. There are management options that can increase the soil's ability to store water for plant use. Soil can be managed in ways that reduce the need for supplementary watering and increase the sustainability of the farm. Any worthwhile strategy for drought management optimizes the following factors:

- capture of a high percentage of rainfall (infiltration)
- maximum storage of water in the soil for later use (water holding capacity)
- efficient recovery of stored water (plant rooting)

To address these issues, this workshop and study tour will feature a variety of presentations representing emergent issues on soil moisture management and conservation for annual crops and orchards given by several speakers.

## Attendees (maximum 25 participants)

- PhD students
- Researchers
- Extension services

## Workshop language

**English** will be the official language

## Venue

The workshop will take place at the  
**Jolanda di Savoia (FE), Cadriano (BO) and Budrio (BO)**

## Organizing and Scientific Committee

### Stefano Caselli

University of Parma

### Luca Corelli Grappadelli

University of Bologna

### Marcello Mastrorilli

CREA Centro di ricerca Agricoltura e Ambiente

### Giancarlo Pagnani

CREA Centro di ricerca Agricoltura e Ambiente

### Matteo Petito

IBF Servizi SpA

### Michele Pisante

University of Teramo, PhD Course 'Crop Science' University of Padova

### Raffaella Zucaro

Canale Emiliano Romagnolo

## PRELIMINARY PROGRAMME

### Monday, 12 September

#### Morning

Participant's arrival at Bonifiche Ferraresi Campus, Jolanda di Savoia (FE)

#### Afternoon

- 15:00 > 16:00 **Registration of participants**
- 16:00 > 16:15 **Welcome** (*M. Pisante*)
- 16:15 > 16:30 **Introduction and programme briefing**  
(*M. Pisante, S. Caselli, L. Corelli Grappadelli, M. Mastrorilli*)
- 16:30 > 17:00 **Remote, ground and proximal measurement: design/methodology/approach for long-term plan/vision and management** (*IBF*)
- 17:00 > 19:00 **Field demonstration** (*IBF; M. Mastrorilli, G. Pagnani*)  
**Technology for integrating digital soil mapping**  
**Visual soil assessment**  
**Ground reference data** (*Elementary Sampling Units*)

#### **Methodologies for in situ determination of:**

- soil properties: granulometry, structure, porosity
- infiltration: at the soil surface in saturated and unsaturated regime, surface crust, cracking
- direct evaporation from the soil: bare soil and cropped soils
- drainage: within the soil profile and deep percolation
- water rising: from soil horizons of different water content and from the water table
- surface runoff: in and off

#### **Methodologies for determining water status:**

- soil sampling techniques
- monitoring techniques and soil moisture sensors

#### **Methodologies for determining root system development:**

- destructive observations
- monitoring techniques
- indirect determinations through proximal sensing systems

20:00

Dinner

## Tuesday, 13 September

### Morning

- 09:00 > 10:30 **DSM data elaboration and softwares** (IBF)
- 10:30 > 11:00 Coffee break
- 11:00 > 13:00 **From soil variability to production unit size** (IBF)
- 13:00 Lunch

### Afternoon

- 14:30 > 17:30 **Field exercises: from water balance to irrigation requirements**  
(M. Mastrorilli, G. Pagnani)

#### Compilation of the soil water balance

- of soil
- of cropped plot

#### Agronomic techniques modulating the terms of the water balance equation

- 17:30 > 19:00 **Report results**
- 20:00 Dinner

## Wednesday, 14 September

### Morning

- 08:00 **Departure to CAAB, V.le Fanin 44 Bologna (BO)**
- 09:00 > 09:45 **Why do we worry about water? Uptake, transport and utilization in the Soil-Plant-Atmosphere continuum**  
(L. Corelli Grappadelli)
- 09:45 > 10:30 **Assessment of fruit traits variability in orchards: sensors & analysis**  
(L. Manfrini, DISTAL UNIBO)
- 10:30 > 11:00 Coffee break

- 11:00 > 11:30 **The bioristor in-vivo sensor**  
*(M. Janni, IMEM-CNR)*
- 11:30 > 12:00 **Case study agronomic crops: Validation of Positive models**  
*(F. Ventura, DISTAL UNIBO)*
- 12:00 > 12:30 **Case study fruit growing: image analysis for crop load estimation, fruit skin blemishes**  
*(G. Bortolotti; A. Bonora, DISTAL UNIBO)*
- 12:30 > 13:00 **Case study autonomous, electric vehicles: the Dedalus Rover**  
*(D. Mengoli, UNIBO)*
- 13:30 > 14:30 Lunch, Cadriano Experiment Farm Dining Hall

## Afternoon

- 14:30 > 17:00 **Field demonstrations**
- 14:30 > 15:00 **Sensors for assessing soil moisture and related sensors**  
*(E. Tavelli, WINET s.r.l.)*
- 15:00 > 15:30 **Setting up ad hoc sensor networks for agriculture with available, off-the-shelf technology**  
*(E. Tavelli, WINET s.r.l.)*
- 15:30 > 16:30 **Practical demo and case studies with bioristor**  
*(M. Bettelli, E. Marchetti, F. Vurro, IMEM-CNR)*
- 16:30 > 17:00 **Autonomous electric orchard vehicles: Dedalus**  
*(D. Mengoli, C. Rossi, UNIBO)*
- 17:00 > 17:30 **Orchard design for automation**
- 17:30 Departure to Jolanda di Savoia (FE)

## Thursday, 15 September

### Morning

- 09:00 > 10:00 **ARPAE climate services and open data supporting climate change mitigation and adaptation**  
*(C. Alessandrini, Osservatorio Clima ARPAE Emilia-Romagna)*
- 10:00 > 10:30 **Vegetation indices for open field crops: from synthetic indices to biophysical parameters**  
*(S. Amaducci, M. Croci, CRAST – UNICATT)*
- 10:30 > 11:00 Coffee break
- 11:00 > 11:30 **Toward impactful irrigation advisory services**  
*(S. Caselli)*
- 11:30 > 12:00 **Acquisition of satellite-based vegetation maps for VR irrigation**  
*(M. Amoretti)*
- 12:00 > 13:00 **Data platform and AI for precision farming: soil moisture modeling and assessment as case study**  
*(M. Francia, UNIBO)*

### Afternoon

- 14:30 > 15:00 **Proximal nuclear sensors for soil water monitoring**  
*(M. Albéri, UNIFE)*
- 15:00 > 15:30 **From sensor technology to true olfactory systems for agriculture**  
*(B. Fabbri, UNIFE)*
- 15:30 > 16:00 **Scalable protocols for sensor data acquisition in precision agriculture**  
*(M. Amoretti, G. Penzotti, UNIPR)*
- 16:00 > 16:30 **GIS-based information systems for monitoring irrigation at farm level**  
*(P. Mantovi, CRPA)*
- 16:30 > 17:00 **Demonstration of the SAMS information system and its features supporting irrigation management**  
*(G. Veneri, P. Mantovi, CRPA)*
- 17:00 Closing

## Friday, 16 September

### Morning

- 8:00 Departure to Budrio (BO)
- 09:00 > 09:30 **Introduction**  
(R. Zucaro – Consorzio CER)
- 09:30 > 10:30 **Precision Irrigation: new water saving approaches**  
(P. Campi – CREA-AA)
- 10:30 > 11:00 Coffee break
- 11:00 > 11:30 **Satellite and sensors: new tools for in-farm irrigation management**  
(T. Letterio – Consorzio CER)
- 11:30 > 12:00 **The use of big data to improve decisions for sustainable water management at the territorial level**  
(F. Cavazza – Consorzio CER)
- 12:00 > 13:00 **Digital water management: examples from reclamation and irrigation boards**

**Automated water gates and remote control: how precision irrigation management can help water savings at the district level**

(A. Mambelli – Consorzio di Bonifica della Romagna)

**New paradigms for reaching out farmers, save water and provide ecosystem services**

(M. Solmi – Consorzio della Bonifica Renana)

### Afternoon

- 14:00 > 17:00 **Field demonstration**  
(S. Gentile and G. Chiari – Consorzio CER)

- Variable Rate Irrigation and Ultra Low Drip Irrigation
- New tools and sensors for the assessment of water demand
- Water retention and water phytoremediation systems



## Registration fee

The Registration Fee is cover by organization. Costs for transportation on arrival and departure as well as lodging are not including in the registration

## Online registration

If you are interested in participating, please complete the registration form



**CLICK HERE**  
FOR REGISTRATION

## Deadline for registration

29th of July 2022



# SUMMER SCHOOL

12 — 16 September 2022



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