Investigations and monitoring at the Venice site (WP3)

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GEOGRAPHICAL INTRODUCTION

The experimental site is located in Ca’ Bianca (12°13’55.218”E; 45°10’57.862”N), right south of the Venice Lagoon.
GEOGRAPHICAL INTRODUCTION

- Bacchiglione River
- Venice Lagoon
- Morto Channel
- Experimental Field
- Paleochannels
SALTWATER CONTAMINATION AT REGIONAL SCALE

Depth of the freshwater-saltwater interface

Map of the vulnerability to salt contamination

Map showing the depth of the freshwater-saltwater interface and a map illustrating the vulnerability to salt contamination.
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SALTWATER INTRUSION DYNAMICS AT LOCAL SCALE

Venice Lagoon 0 m amsl

Brenta River

Bacchiglione River

Pumping station

SALINE GROUNDWATER

Morto Canal

Bacchiglione River

Pumping station

Venice Lagoon
SALTWATER CONTAMINATION IN THE PILOT SITE:
Saltwater variability in watercourses and subsoil

Shallow and deep subsoil
Paleochannels are characterized by high sand percentage and low salinity.

Electrical resistivity tomography (ERT)
EXPERIMENTAL SITE CHARACTERIZATION

soil EC mapping by using electromagnetic induction (EMI) sensors (CMD - MINIEXPLORER)
EXPERIMENTAL SITE CHARACTERIZATION

Soil texture
The area has been characterized thanks to data collected during previous studies.

It’s time for a MITIGATION STRATEGY.

**OBJECTIVE: supply freshwater to the farmland taking advantage of sandy paleochannels**

New monitoring network

- Monitoring salt water intrusion in both watercourses and groundwater
- Monitoring soil water and salinity dynamics inside and outside paleochannels
- Assess the effect of water and salt dynamics on productivity and grain quality
MONITORING OF SURFICIAL WATER QUALITY
August 2019 - Morto Channel Electrical Conductivity (EC)
MONITORING OF SURFICIAL WATER QUALITY
August 2019: Electrical Conductivity in the Brenta and Bacchiglione rivers

Brenta river

Bacchiglione river
EXPERIMENTAL SITE CHARACTERIZATION

Identification of highly permeable sandy paleochannels

Identification of 5 MONITORING STATIONS

- Experimental field area: 11.7 ha
- Altitude: -1 to -3 m below MSL
- Crop: maize (sowing date 3/24/19; harvesting date 10/1/19)
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**MONITORING STATION design:**

- 4 SOIL MOISTURE and ELECTRICAL CONDUCTIVITY sensors (TEROS 12, METER Group) installed at 4 depths (10, 30, 50 and 70 cm)

- 2 or 3 TENSIOMETERS (T4e, METER Group) installed at 2 or 3 depths (30, 50 and 70 cm)

- 1 PIEZOMETER (2m deep)
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SAMPLING design:

- SOIL SAMPLING and soil TEXTURE analysis
- 4 BIOMASS SAMPLINGS (7/25, 8/2, 8/13, 9/20): harvest and analysis of 2 m² of biomass per each monitoring station
- WATER TABLE measurements (once per week)
- Ground water electrical conductivity (EC) and temperature measurements (once per week)
WEATHER DATA acquisition

ATMOS41 all-in-one weather station with ZL6 datalogger (METER Group)
GROUND WATER EC AND WATER TABLE MONITORING

Ground Water EC

Water Table

Station_1  Station_2  Station_3  Station_4  Station_5

Station_1  Station_2  Station_3  Station_4  Station_5
SOIL VOLUMETRIC WATER CONTENT and SOIL EC monitoring – STATION 2

**Electrical Conductivity (EC) - STATION 2**

- EC_10cm
- EC_30cm
- EC_50cm
- EC_70cm

**Volumetric Water Content (WC) - STATION 2**

- WC_10cm
- WC_30cm
- WC_50cm
- WC_70cm
SOIL VOLUMETRIC WATER CONTENT and SOIL EC monitoring – STATION 5

Electrical Conductivity (EC) - STATION 5

Volumetric Water Content (WC) - STATION 5
Soil Water Matric Potential - STATION 2

Soil Water Matric Potential - STATION 5
**Biomass Sampling Results**

**Biomass Nitrogen %**

- 7/25/2019
- 8/2/2019
- 8/13/2019

*BioMass sampled on the 9/20/19 (10 days before harvesting)*

DM values refer to 1 m² of biomass

**Grain Analysis**

- Protein [%]
- Fat [%]
- Starch [%]

**Dry Matter (DM) and Harvest Index**

- Grain DM
- Total DM
- Harvest Index

*Interreg Italy - Croatia MoST*

European Regional Development Fund
Sensors in the combine harvester measure the yield and grain moisture.

Geographic coordinates are added using GPS satellite data.
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YIELD MAPPING
From point layer to continuous map by using geostatistical tools

SALINITY EFFECT
YIELD MAPPING
From point layer to continuous map by using geostatistical tools

SANDY PALEOCHANNEL EFFECT
Thank you for your attention