Interreg
Greece-Italy
IR2MA

European Regional Development Fund

EUROPEAN UNION

3RD WORKSHOP On "APPLICATION OF TECHNOLOGICAL TOOLS IN AGRICULTURAL CROP PRODUCTION"

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IRRIGATION STRATEGIES AND SOIL MANAGEMENT USING HIGH-TECH SOIL MOISTURE-BASED SENSORS

Dr. Andi Mehmeti
mehmeti@iamb.it

Prof. Dr. Mladen Todorovic
mladen@iamb.it

THE NEED FOR SENSOR-BASED IRRIGATION MANAGEMENT

Efficient management of water resources is of utmost importance for the sustainability of irrigated agriculture, particularly in Mediterranean, a dynamic region, which is highly dependent on irrigated agriculture.

Soil salinity and **moisture** are important factors affecting agricultural production in arid regions (Xu et al., 2019).

The knowledge of these factors is an important practical consideration to improve **irrigation decisions.**

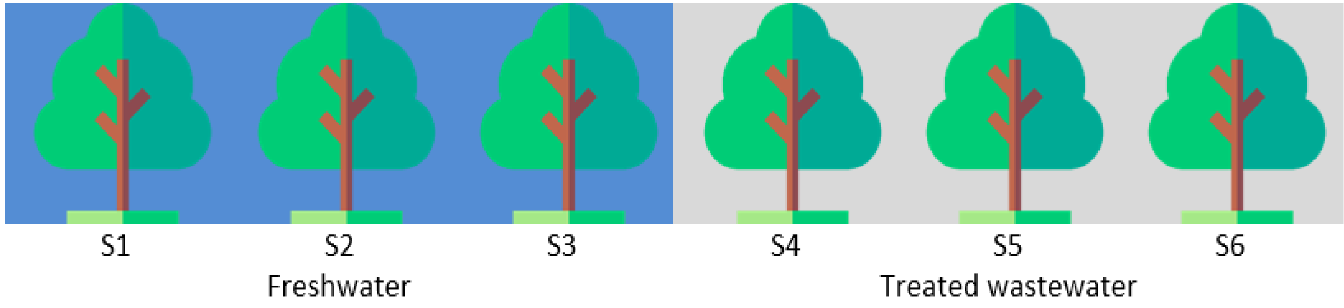
The most **important** tools in modern **agriculture** management are **sensors**. They can be used as an irrigation management tool to :

Save water

Improve yields and profitability

Energy saving

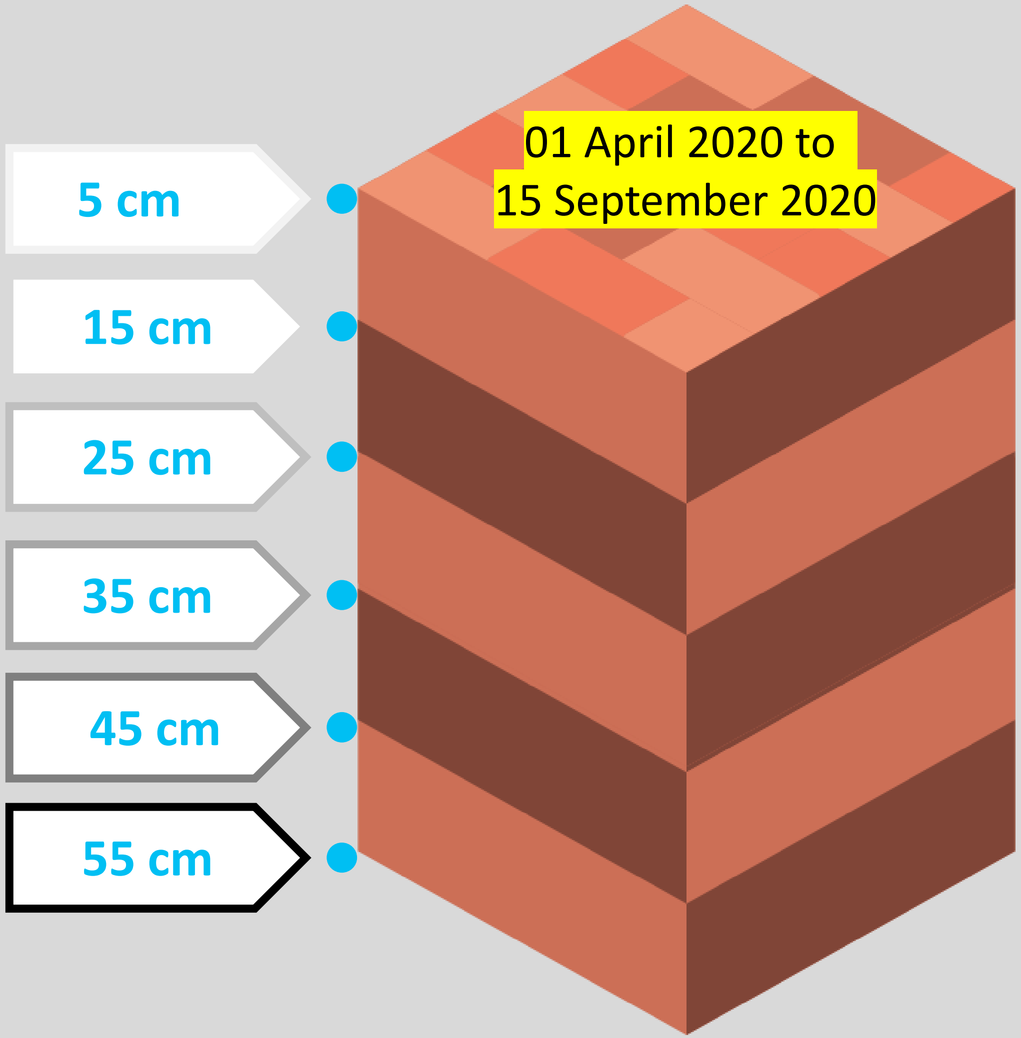
Reduce Environmental impacts



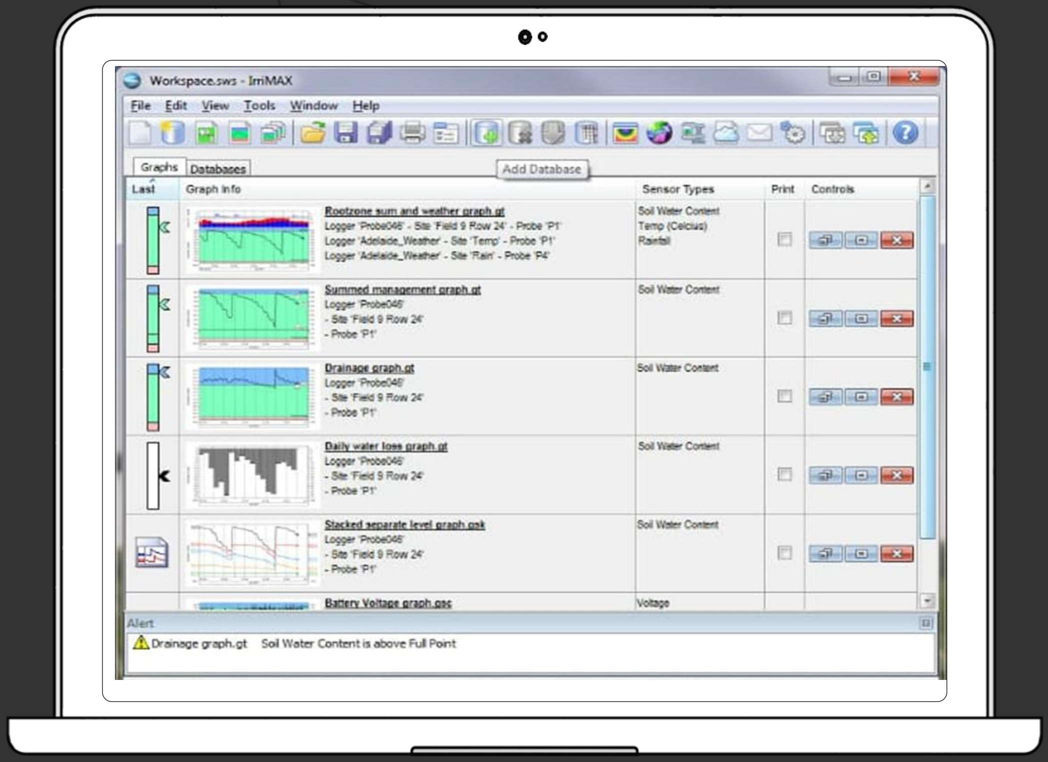
IR2MA demonstration activities

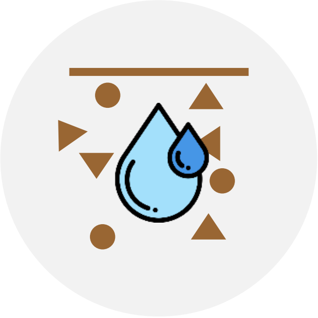
One of the goals of the IR2MA project was the implementation of sensor-based irrigation systems in an orchard Southern Italian farm to monitor soil-water relation parameters of crop growth under conventional groundwater and treated wastewater.

Soil Moisture, Salinity And Temperature Measurement.



IRRIMAX Advanced Sensor Software





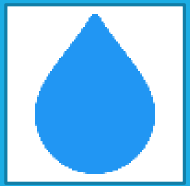
Soil water content (SWC)

Volumetric Ion Content (VIC)

Soil temperature (ST)

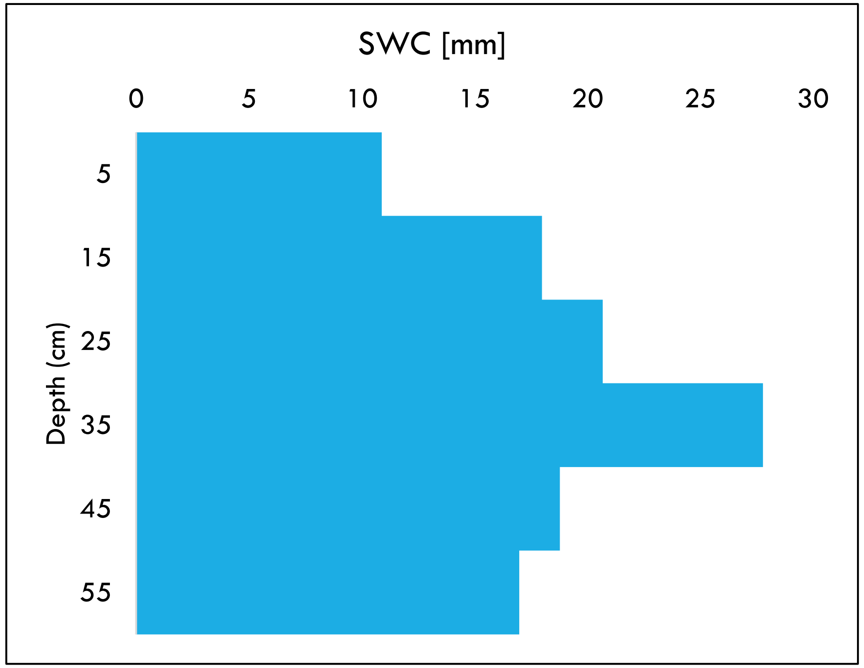
SOIL WATER CONTENT (SWC)

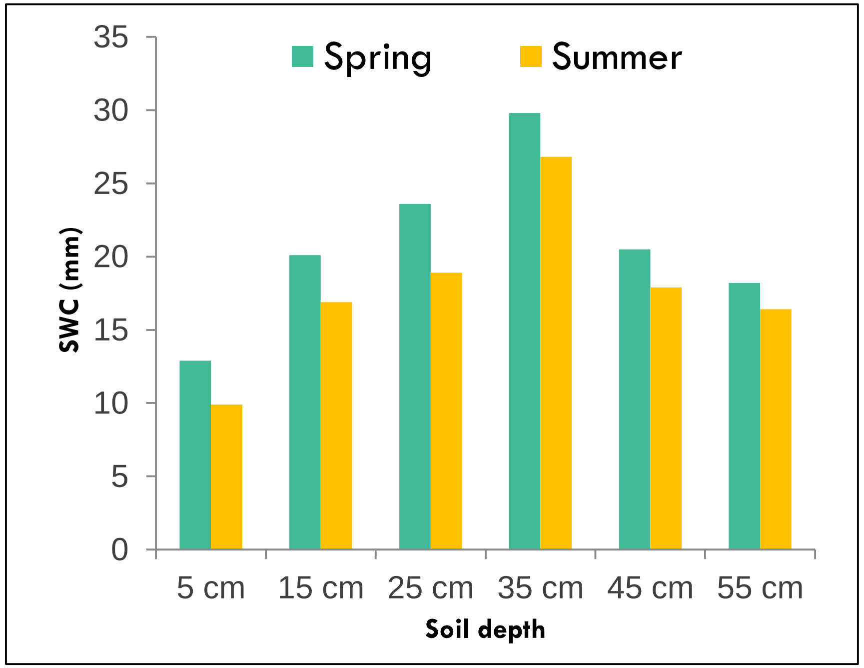
- The soil moisture at the upper layers shows larger dynamics than the soil moisture at deeper layers.
- In the upper soil layer or T1 (0-5 cm), the SWC was lower than those of T2 (5-15 cm) and T3 (15-25 cm).
- SWC at different depths in the summer period was lower than spring. SWC in the TWW plots was generally > than in FW plots. This attributed to reduced root water uptake, reduced evaporation through the soil surface, or both (Rahav et al. 2017).



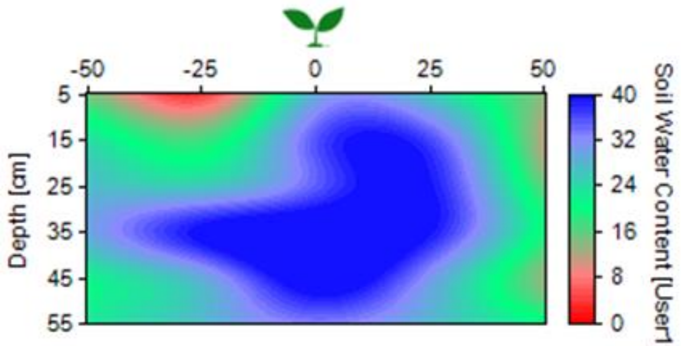
113,2 mm

154 mm





SOIL WATER CONTENT (SWC) - FIELD SPATIAL VARIABILITY



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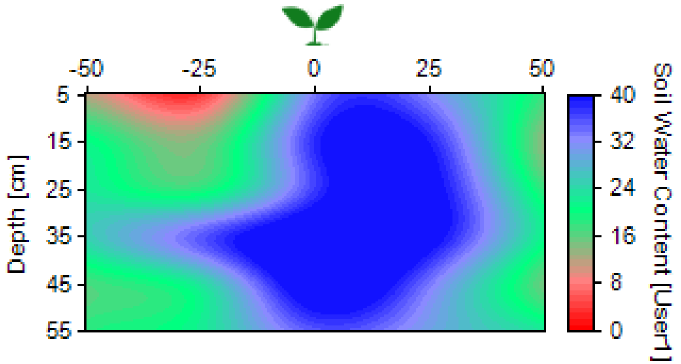

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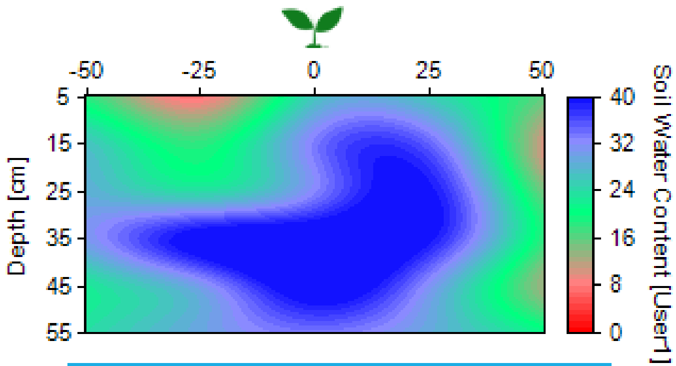

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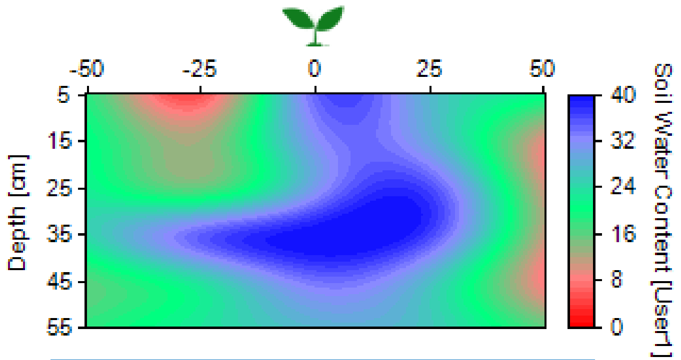

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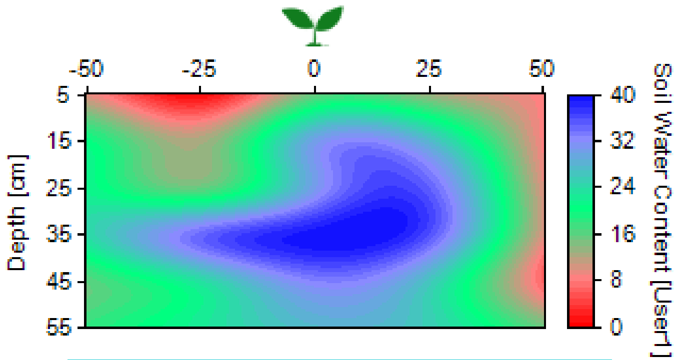

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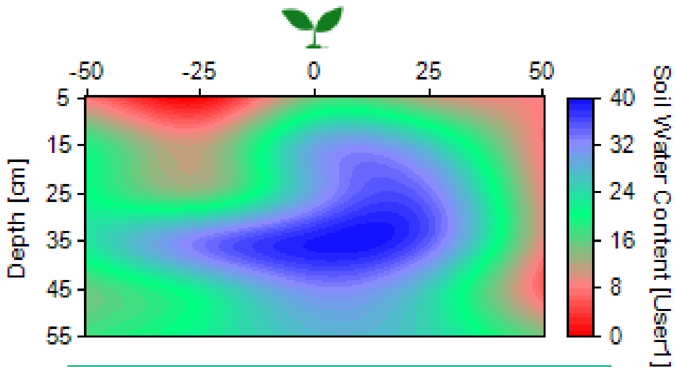


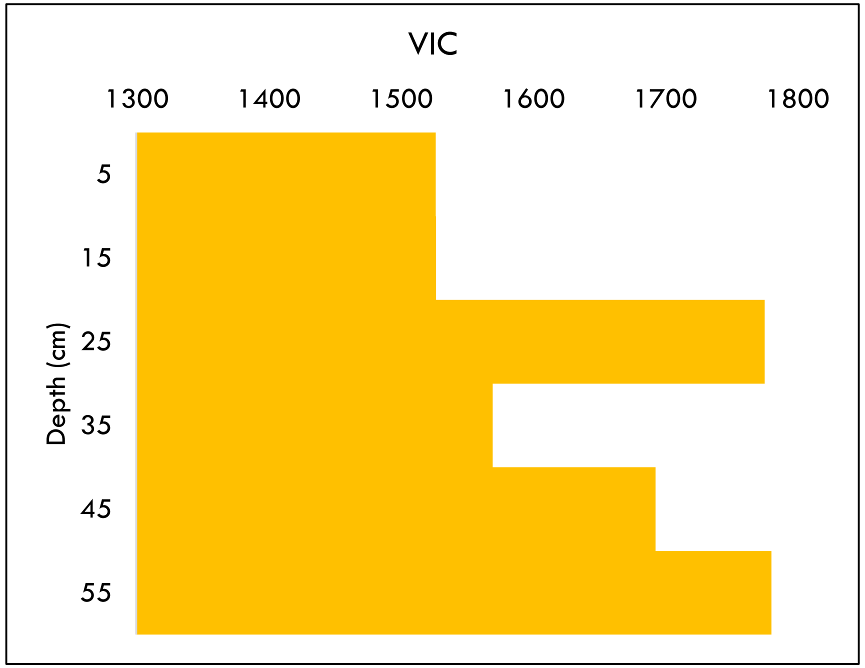
15 September

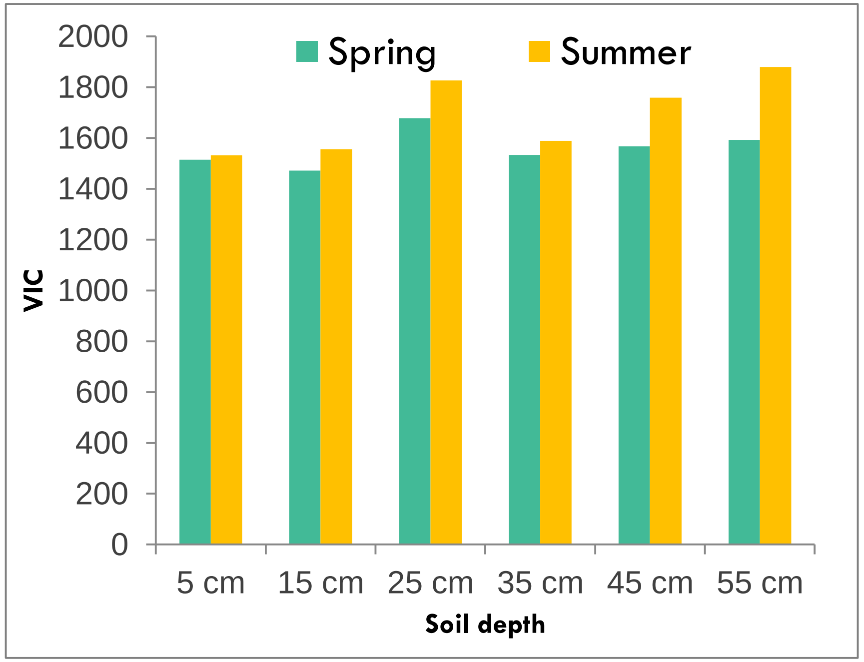
Volumetric ion content (VIC) - Salinity

- Acceptable VIC data range from 1000 to 17,000. Values above 5000 VIC are generally considered to be causing significant plant stress and loss of yield.
- The general patterns indicate that VIC increased with depth and increasing trend in salinity over summer
- The results revealed that the high salt concentrations in the TWW induce high average salinity. Similar results were reported by other authors (Kaboosi 2017; Lyu and Chen 2016; Rahav et al. 2017).

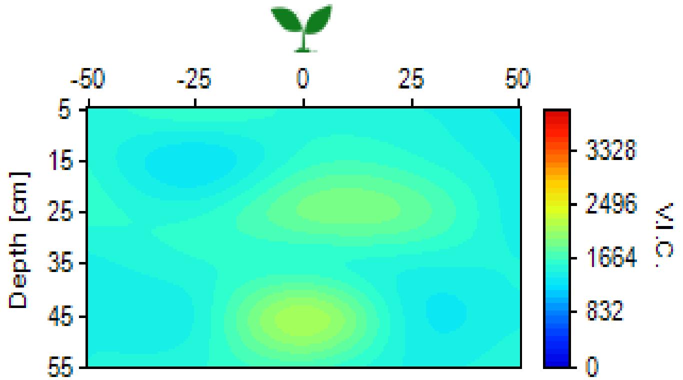
1526 VIC

1585 VIC





VOLUMETRIC ION CONTENT (VIC) - FIELD SPATIAL VARIABILITY



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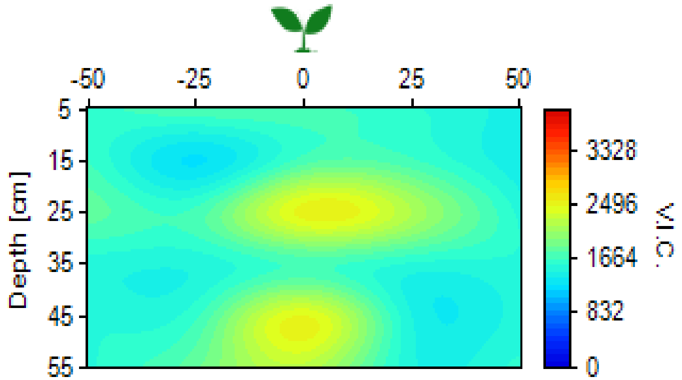

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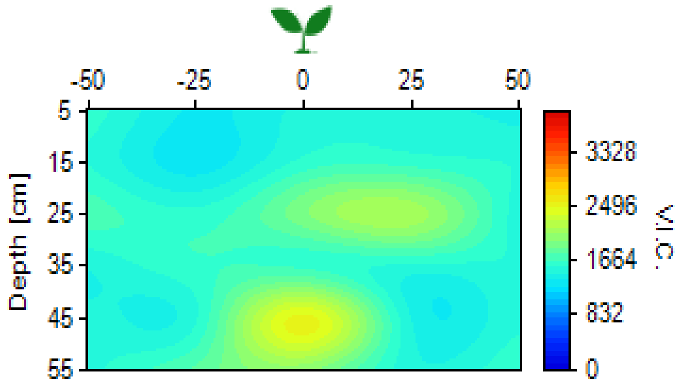

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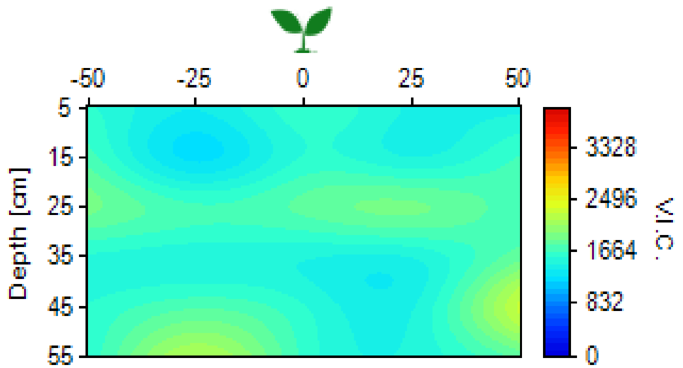

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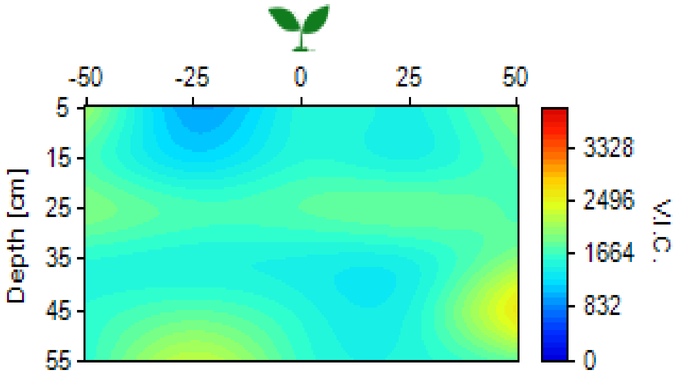

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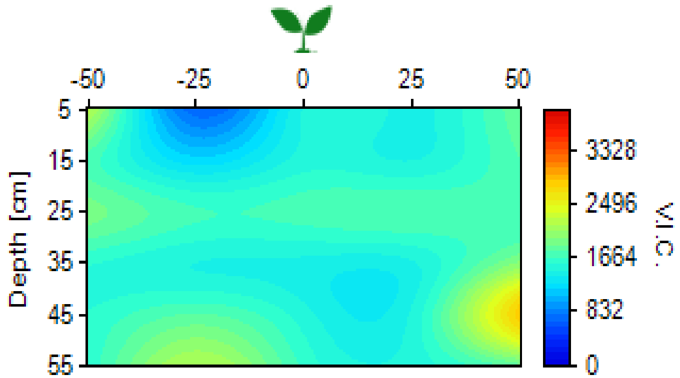


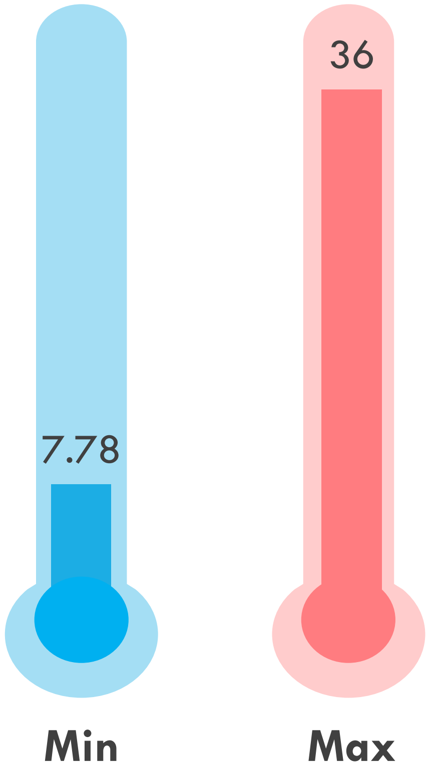
15 September

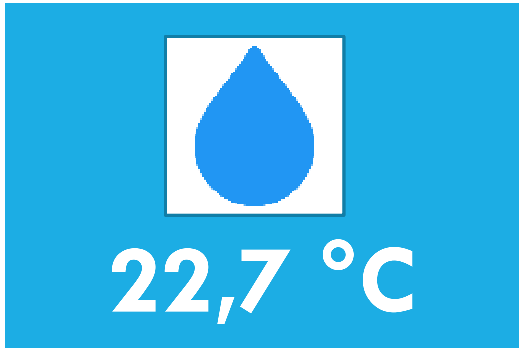
Soil Temperature (ST)

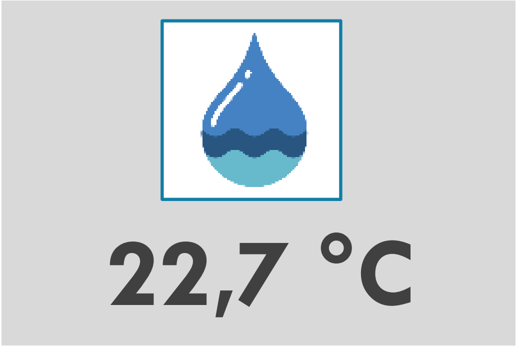
Ideal soil temperatures for planting most plants are 18-24 °C.

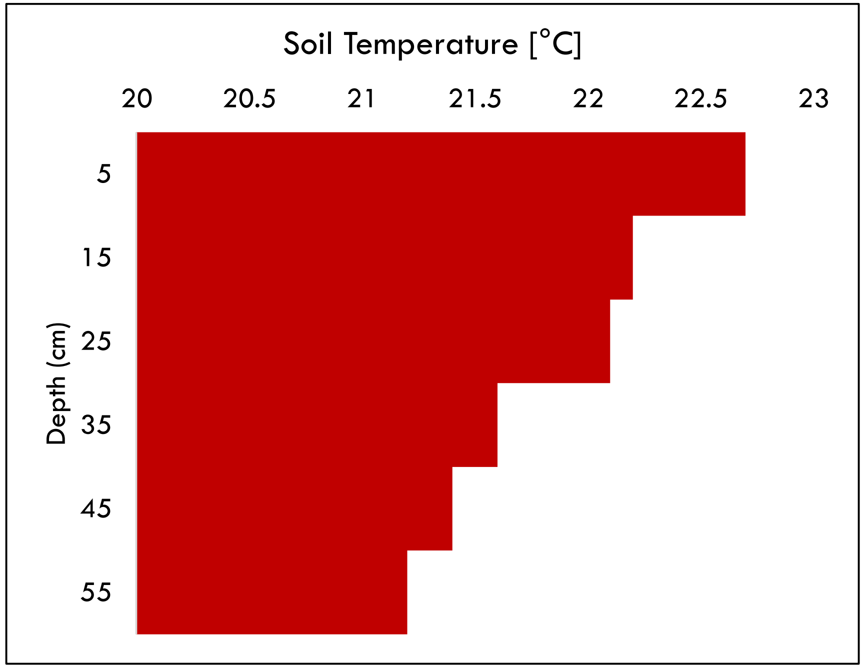
The increase in soil temperature followed a T1 < T2 < T3 < T4 < T5 pattern (decreases with an increase in depth).

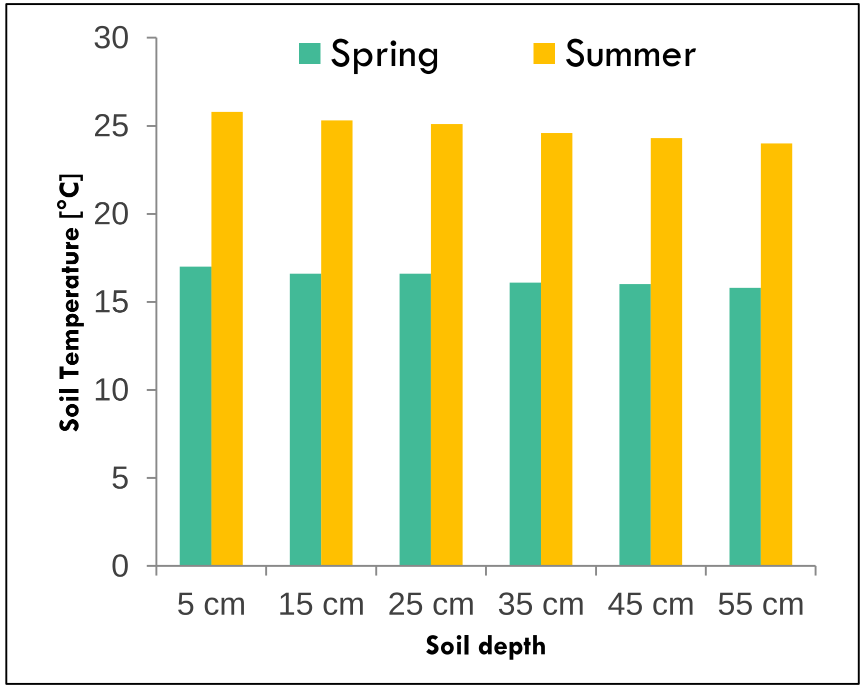
Soil temperature was quite similar at both monitoring irrigated plots.



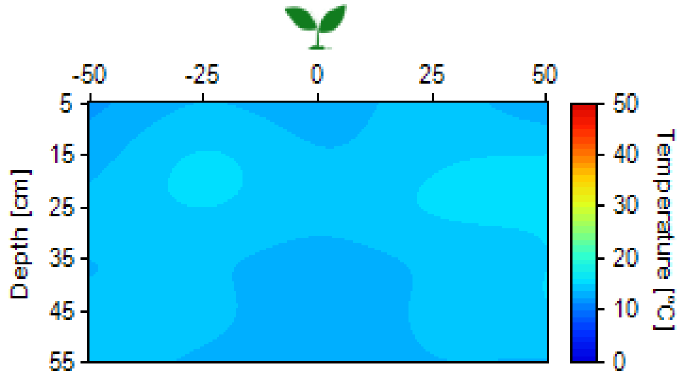








SOIL TEMPERATURE (ST) – FIELD SPATIAL VARIABILITY



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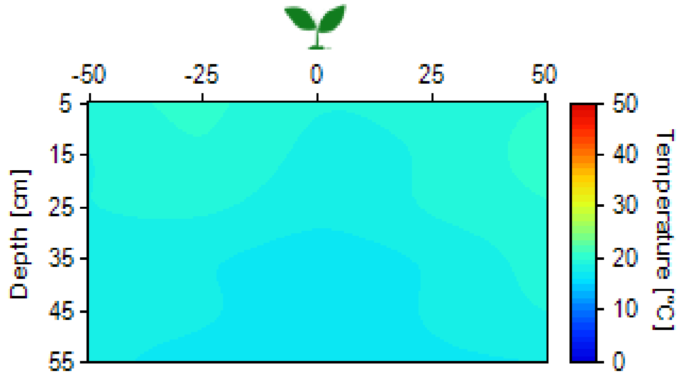

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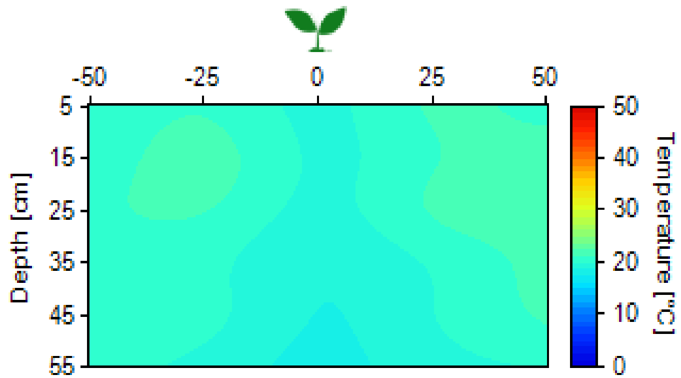

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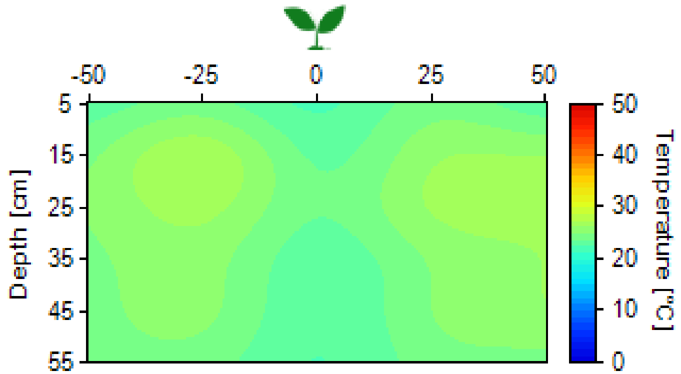

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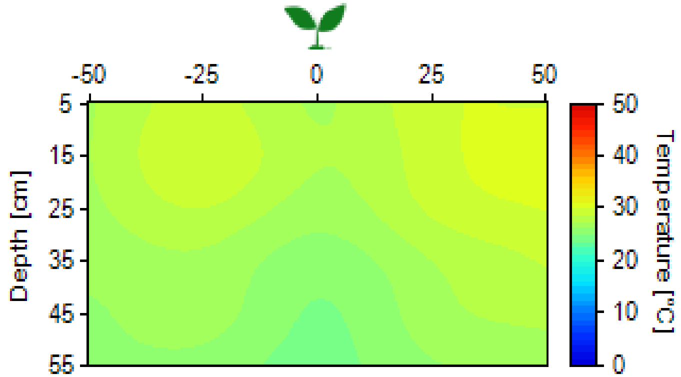

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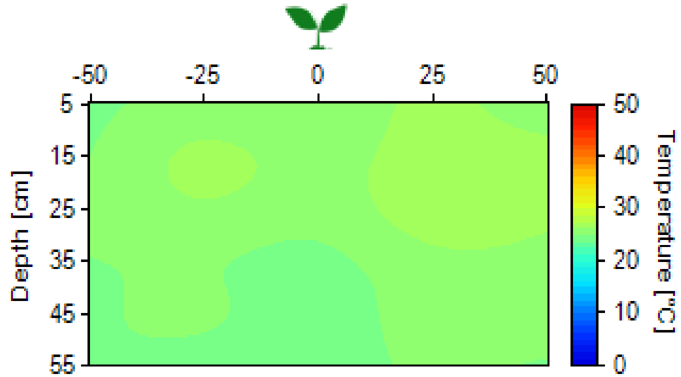
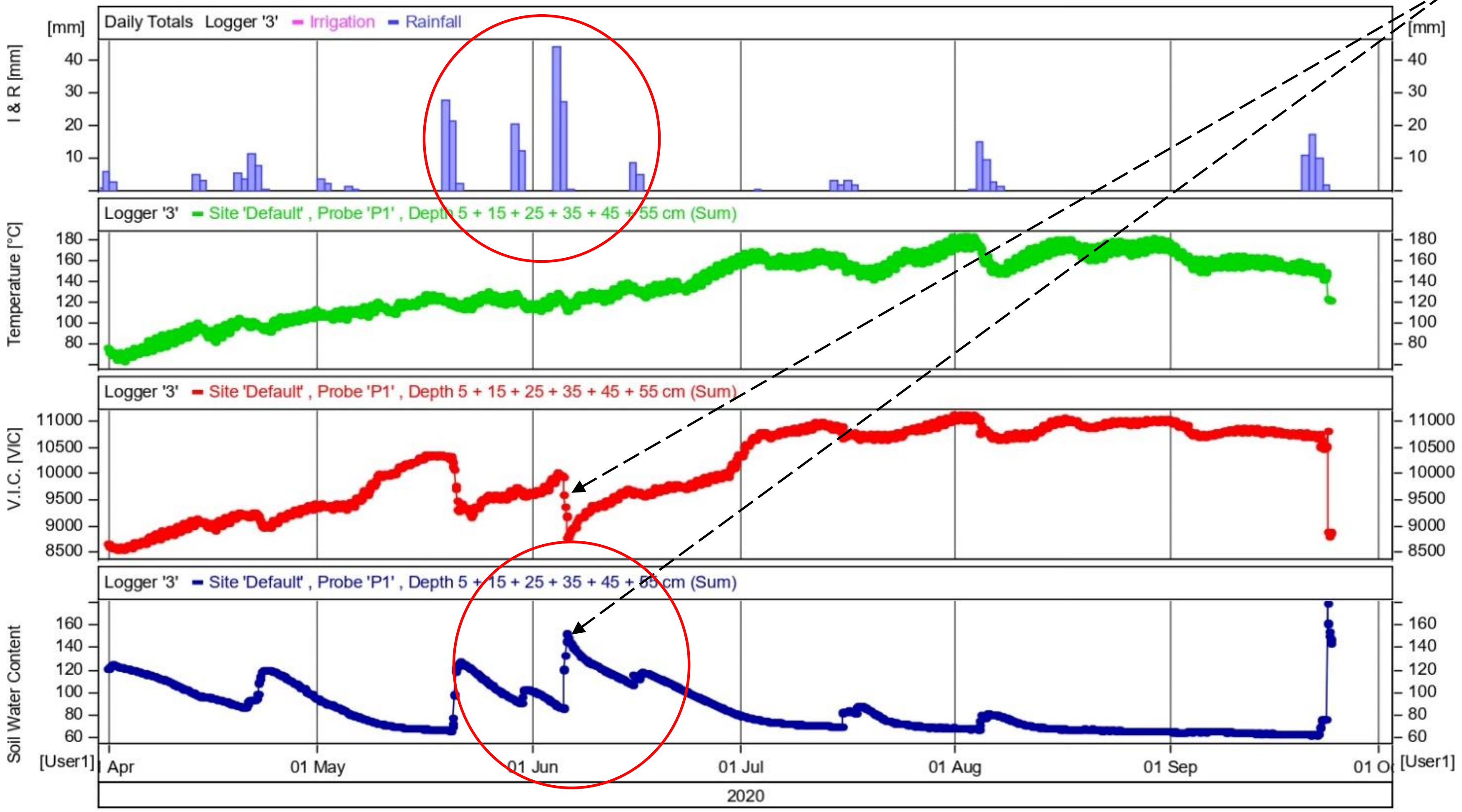


15 September

TREND AND RELATIONSHIP BETWEEN RAINFALL, SWC, SALINITY, AND SOIL TEMPERATURE

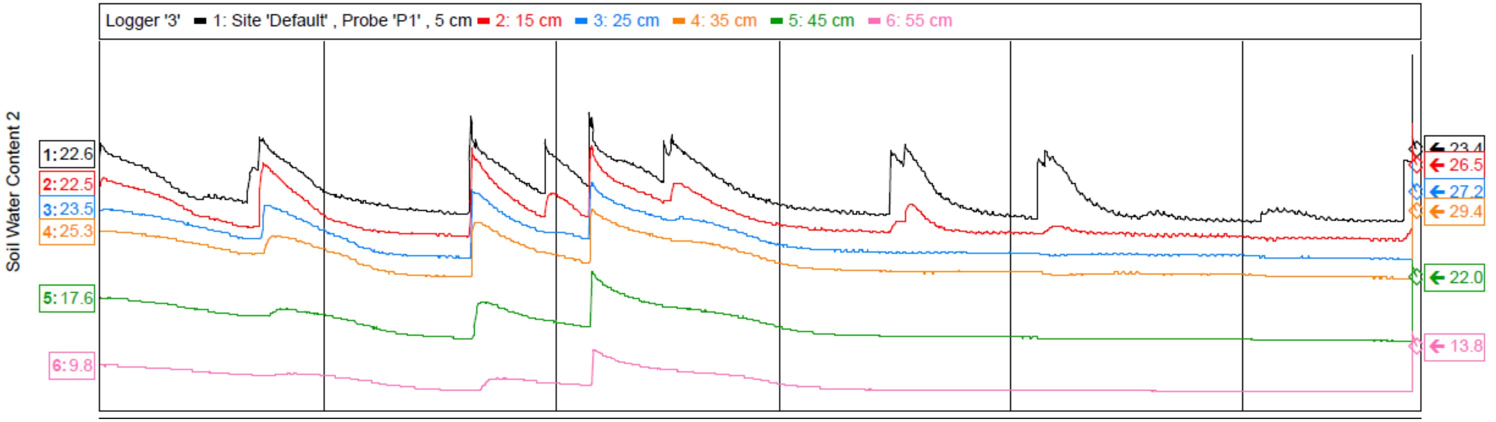


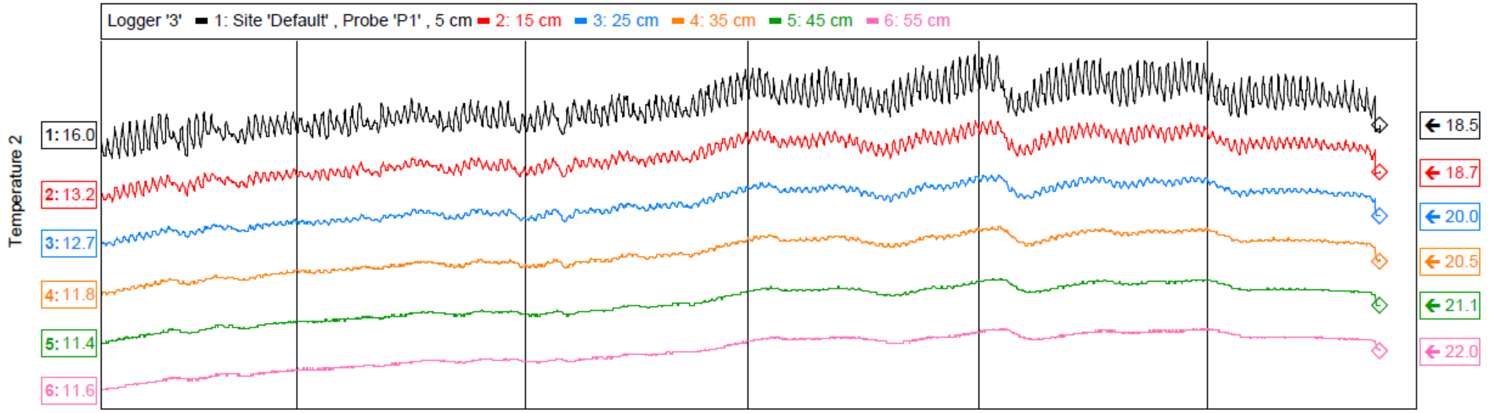
Soil moisture gradually or sharply increases after rainfall events while VIC and soil temperature would decrease

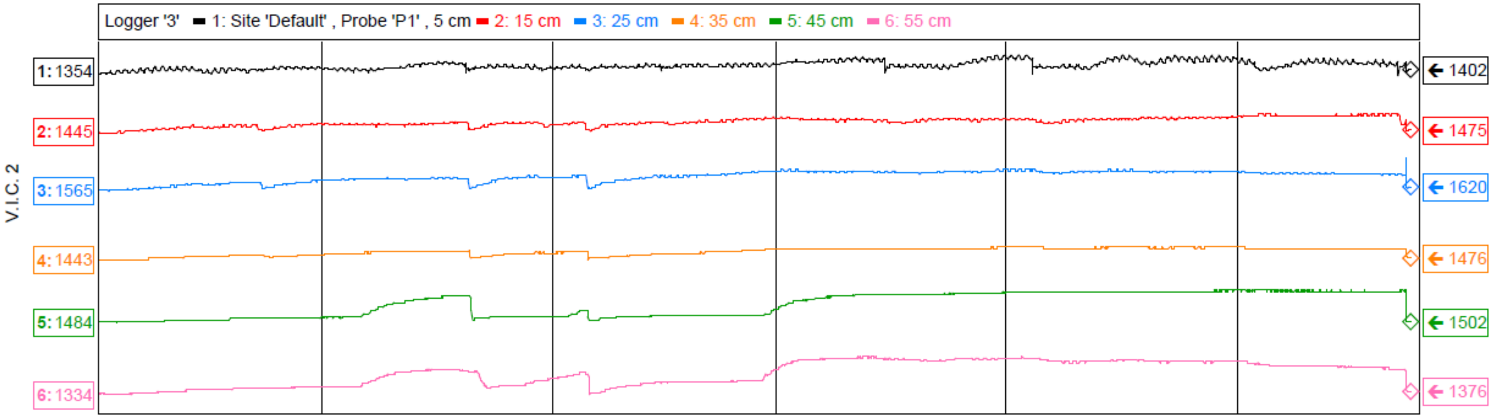
Soil moisture tends to decrease in summer due to the higher solar energy available.

Effective irrigation management is needed during summer months.

TREND AND RELATIONSHIP BETWEEN RAINFALL, SWC, SALINITY, AND SOIL TEMPERATURE







CONCLUSIONS

1. The overall results of this experiment indicated that irrigation water quality influences the physical and chemical properties of the soil.
2. The use of TWW can lead to a decrease in soil infiltration rate, an increase in soil water content but slightly higher salinity.
3. Higher levels of salinity in the irrigation water are not dangerous confirming the as irrigation source.
4. The results from the sensors installed in the field show that they provide valuable information for irrigation and salinity management.

Thank You

Interreg Greece-Italy
IR2MA
European Regional Development Fund
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Dr. Andi Mehmeti
+393275563659
mehmeti@iamb.it
www.interregir2ma.eu