



# **USE OF IRRIDESK, AN AUTOMATIC IRRIGATION SYSTEM, FOR WATER EFFICIENT MANAGEMENT IN PROCESSING TOMATO**

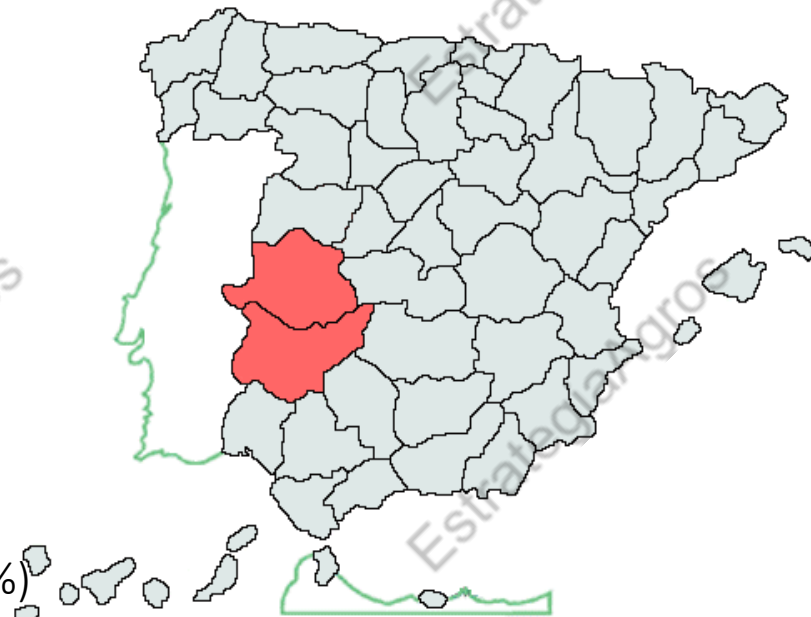
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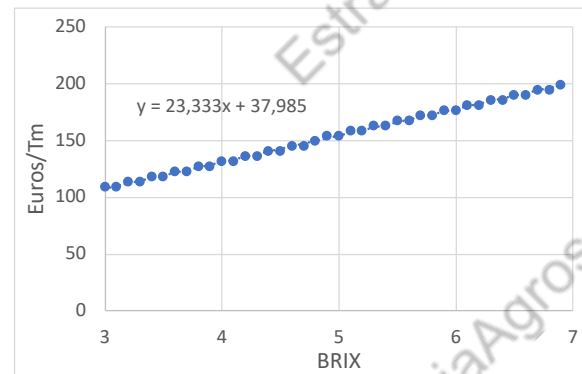
- 🍅 In **Extremadura**, 20000 ha of processing tomato (1,8 M TM) 75% from Spain and 5% of the world
- 🍅 Drip fertigation systems (Irrigation every days and fertilization weekly). **Fertilizer cost increase**
- 🍅 Irrigation limits around 6000-7000 m<sup>3</sup>/ha. But in the last two years, **climate change and drought** have caused water restrictions, reducing the water by 25-30%, around 5000 m<sup>3</sup>/ha.
  - 🍅 Reduction of the ground surface (around of 25%)  
**Most farmers. Reduction of profit**
  - 🍅 Use of deficit irrigation strategies (reduce of 25% of water). **Risks of loss of profitability**



## What is the best option?

## DEFICIT IRRIGATION

To apply water below the crop's needs to obtain a significant saving in irrigation water and **increase fruit quality** with a reduced risk of crop loss yield, i.e., producing a higher value product for less money.



- 🍅 Use of deficit irrigation strategies is a more efficient solution to maintain production and profit.
- 🍅 The application of strategies depends on several factors that can influence their correct or incorrect application, which can lead to production losses if they are not applied correctly.

**SOLUTION:** USE OF NEWS TECHNOLOGIES: **DIGITAL TWIN AND AUTOMATIC IRRIGATION**

## AUTOMATIC IRRIGATION SYSTEM


The automated irrigation system was calibrated through an INIA project on different crops in which the University of Almeria, IRTA, Labferrer and CICYTEX participated.

### AUTOMATIC IRRIGATION SYSTEM COMPONENTS

1) SENSORS IN FIELD

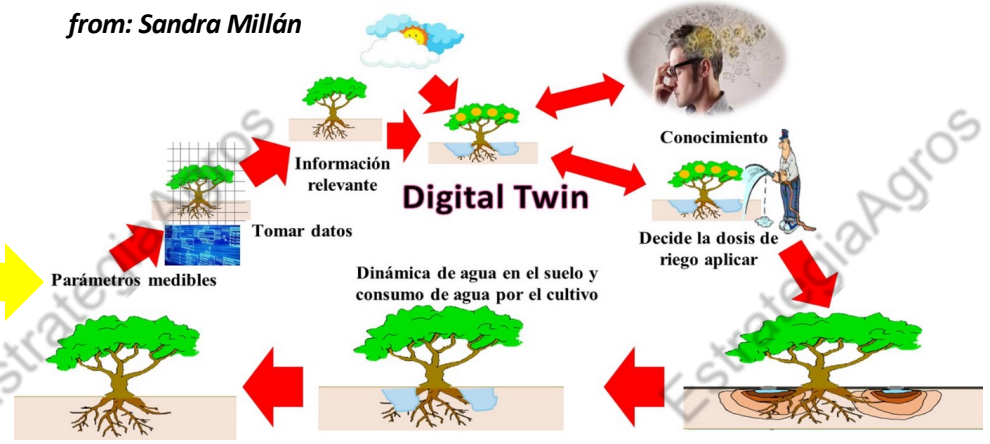
2) DATA IN CLOUD

3) IRRIDESK WEB PLATFORM






4) IRRIGATION PROGRAMMER

from: Sandra Millán



- Agroclimatic data, Crop data, Irrigation data and integration of different sensors for irrigation adjustment
- **Seasonal plan: distribution of water throughout the season (established for a maximum of 5000 m<sup>3</sup>/ha).**

-  To evaluate using the IRRIDESH irrigation automation system for smart water management in processing tomato cultivation.
-  To evaluate how the IRRIDESH system achieves profitable productions with a water consumption limit of less than 5000 m<sup>3</sup>/ha.
-  To evaluate incorporating two controlled deficit irrigation strategies in processing tomatoes in an automated irrigation system.

**DigiSPAC** Evaluation of the digital twin paradigm applied to precise fertigation management.

## Demonstration trial

Variety: Processing tomato H1015

Transplanted 15 April 2023

Harvest 10 August 2023

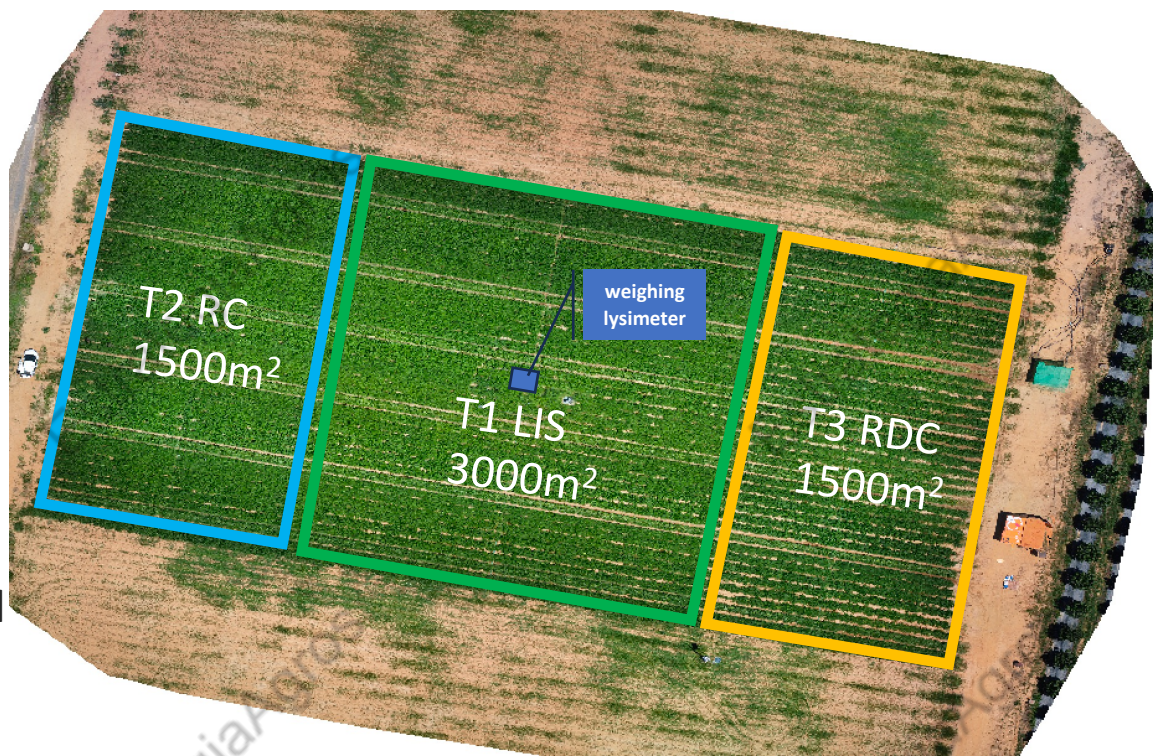
Treatment:

T1: Irrigation according to crop requirements (LIS)

T2: Deficit Irrigation in the maturation phase (RC)

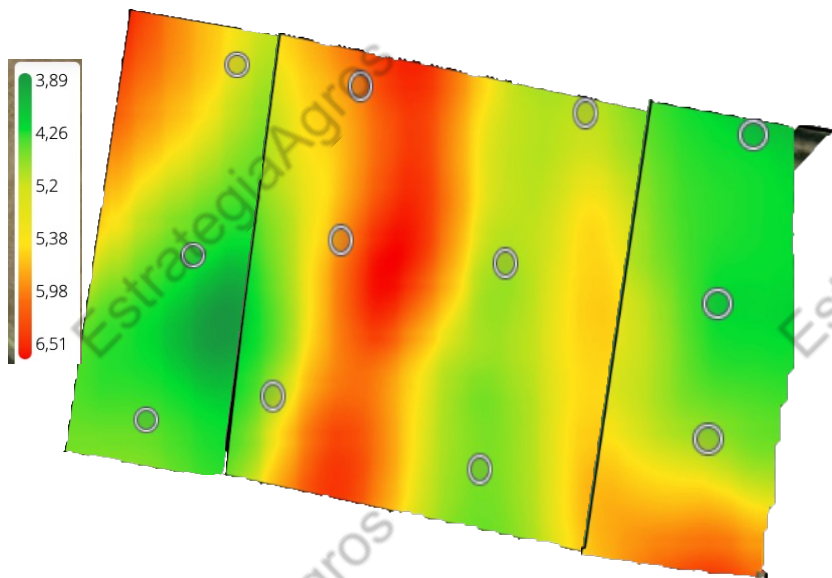
T3: Deficit Irrigation in the initial and maturation phase (RDC)

Experimental field of tomato crop at CICYTEX experimental farm, in Guadajira

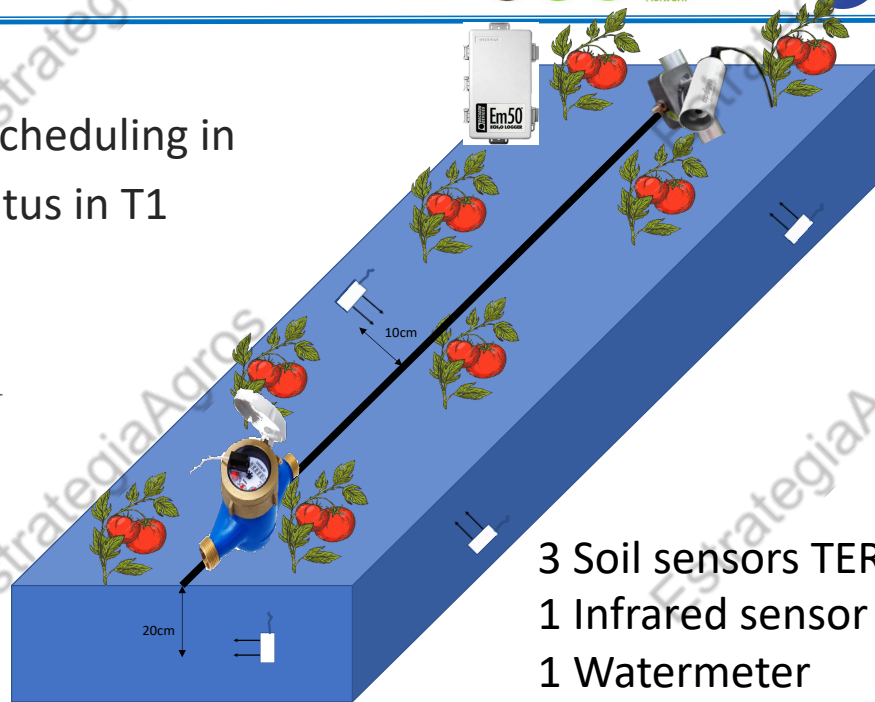


## Control points

Three control points to adjust the water scheduling in T2 and T3 and six points to crop water status in T1



Apparent Electrical conductivity map

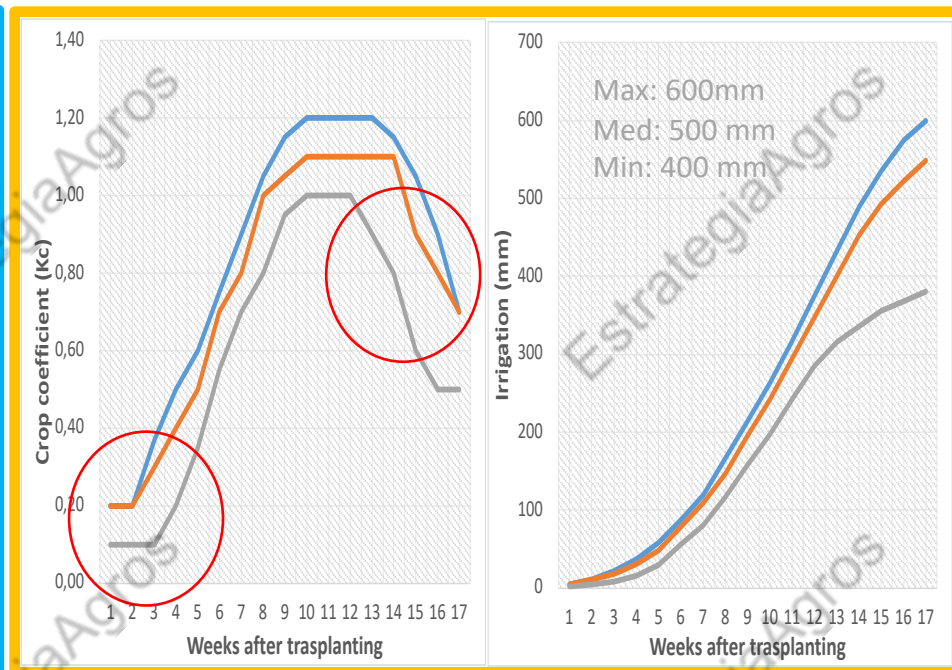
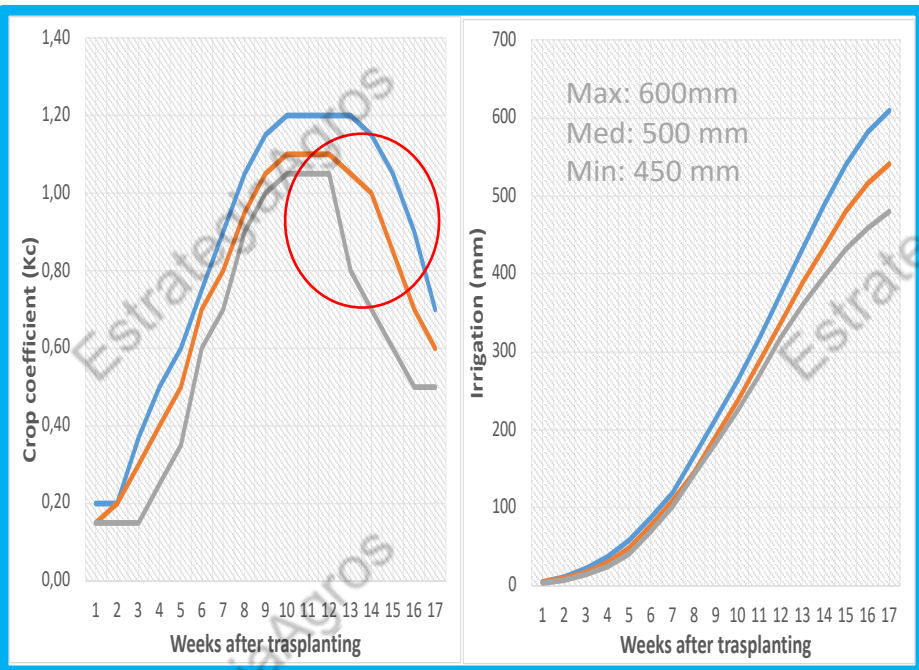


- 3 Soil sensors TEROS 10
- 1 Infrared sensor (Apogee)
- 1 Watermeter
- Measure of leaf water potential (weekly)
- Multispectral and thermal image (drone)

## Irrigation plan

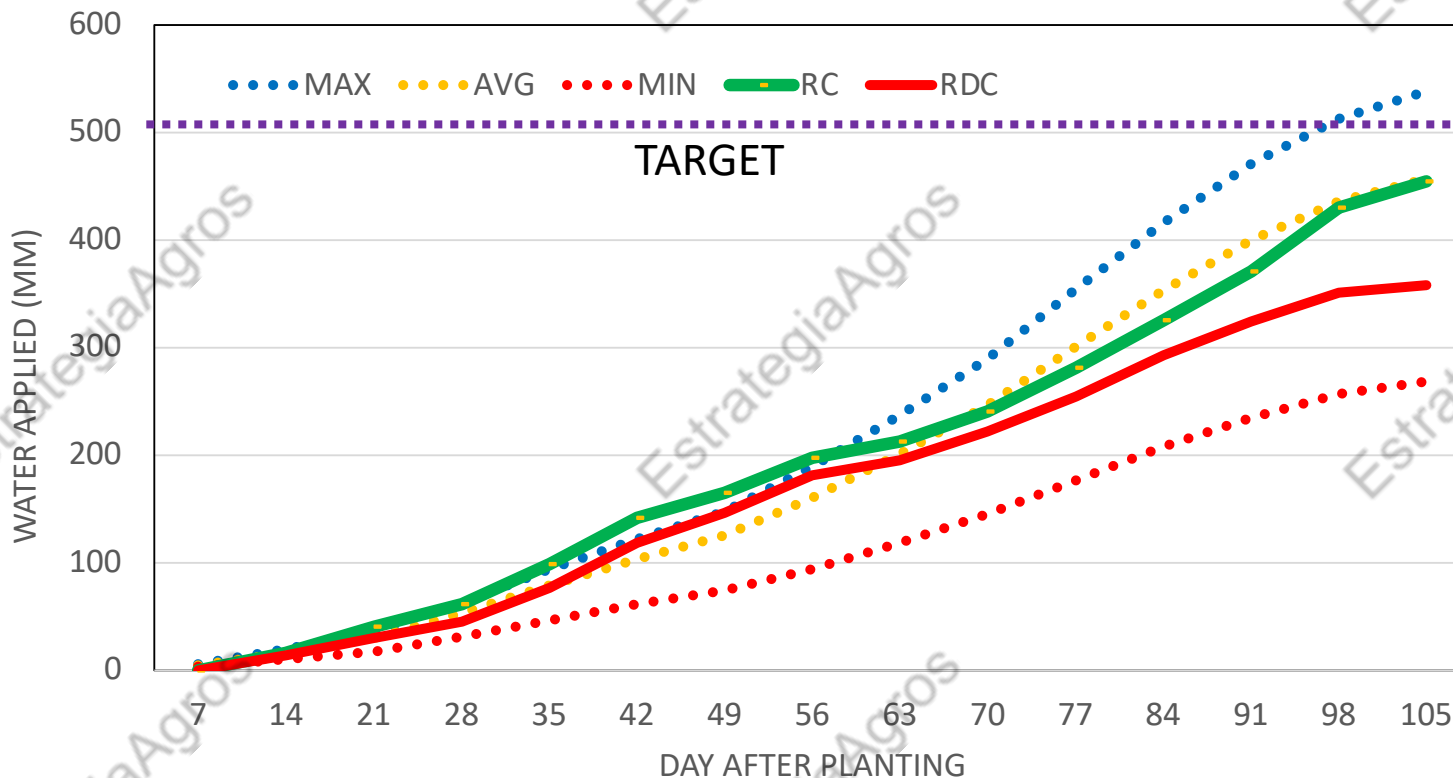
Deficit irrigation maturation phase

Deficit irrigation initial and maturation phase

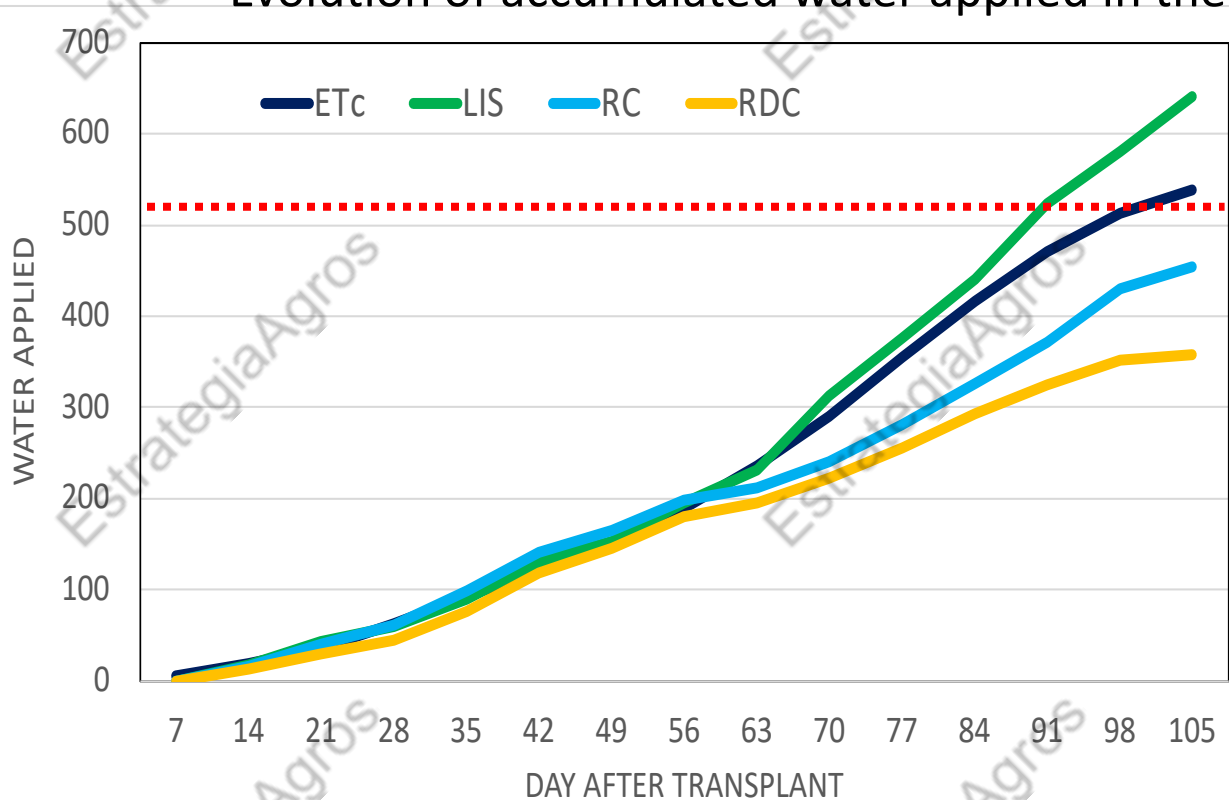




## Evolution of accumulated water applied

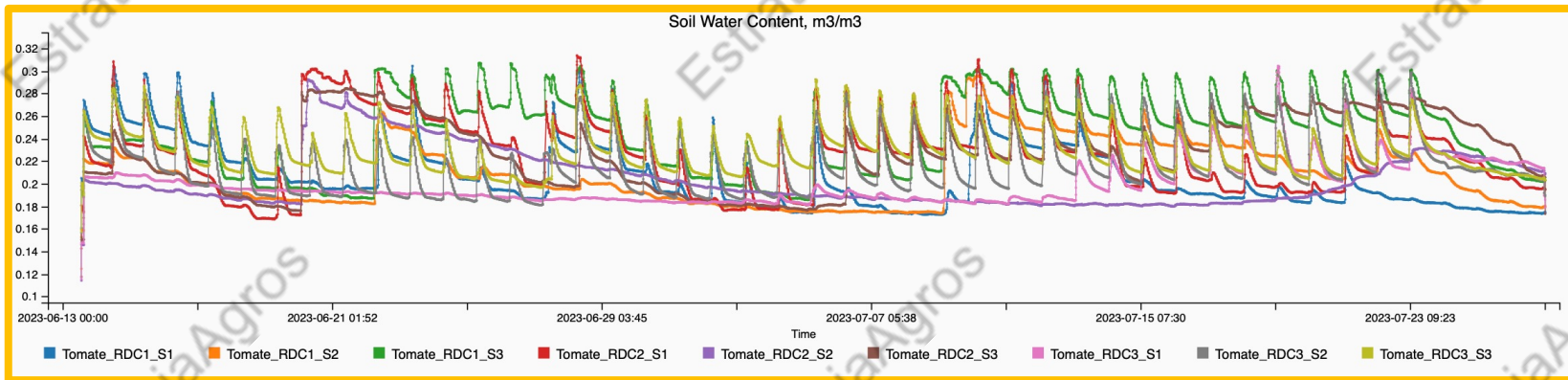
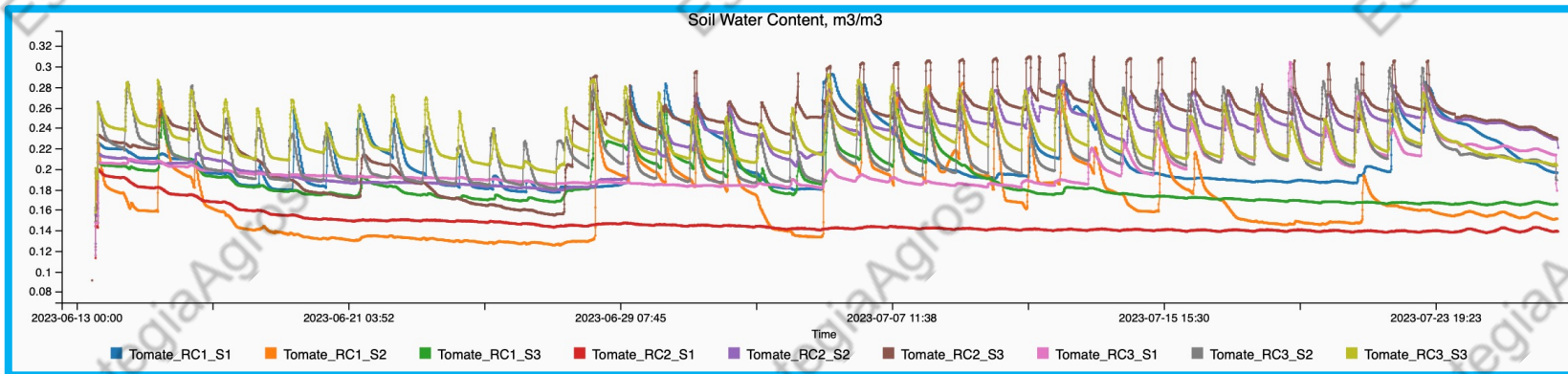


## Evolution of accumulated water applied in the treatments

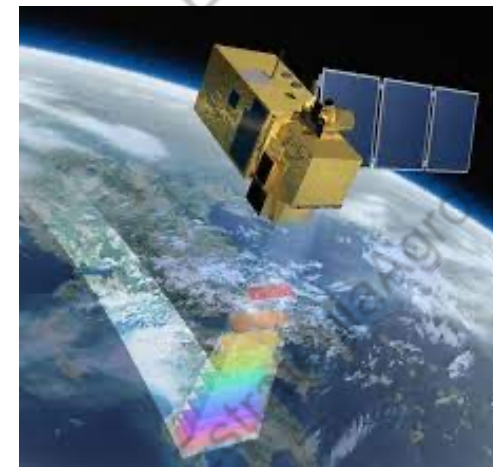
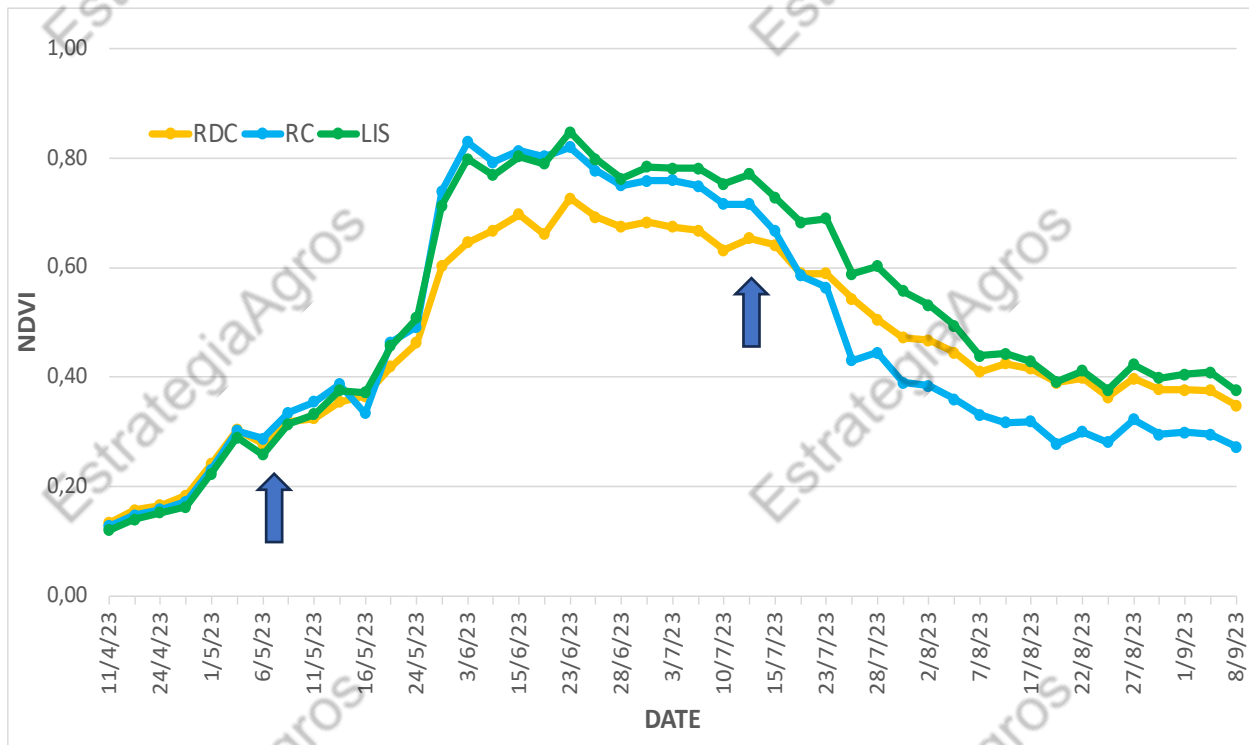


Treatments	Irrigation	Rainfall
T1 (RC)	400	54
T2 (LIS)	586	54
T3 (RDC)	304	54

# The evolution of soil moisture sensors measures



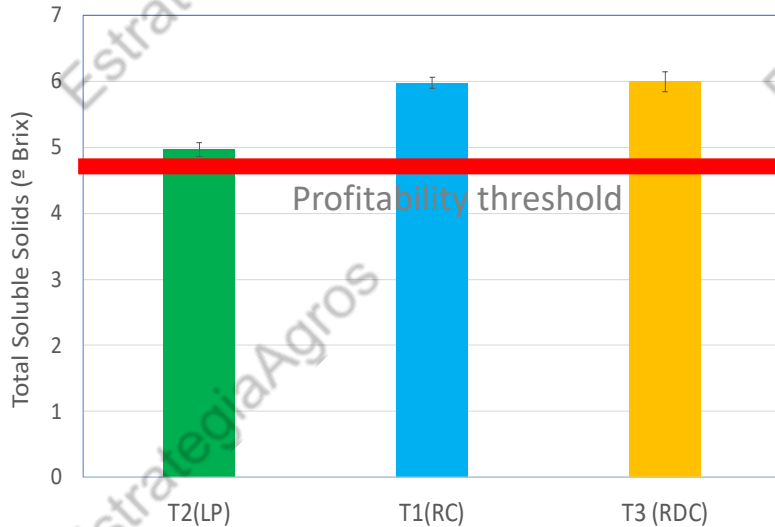
## The evolution of crop development with NDVI measures



## Commercial Yield



Treatments	YIELD	EUA
T1 (RC)	107	235
T2 (LIS)	135	212
T3 (RDC)	83	232



5000m<sup>3</sup>/ha

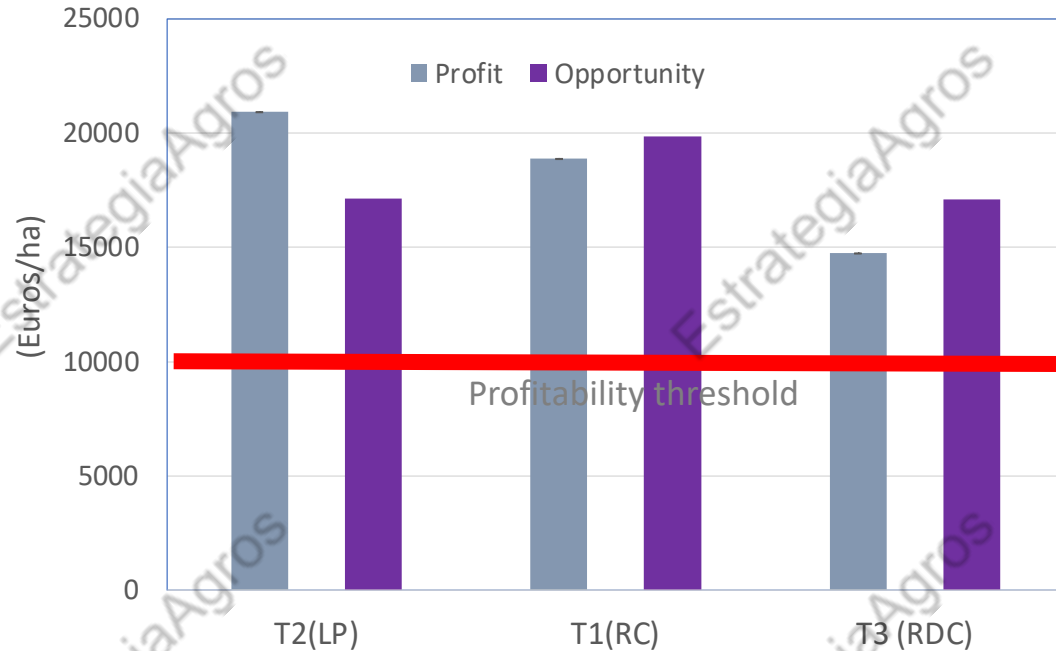
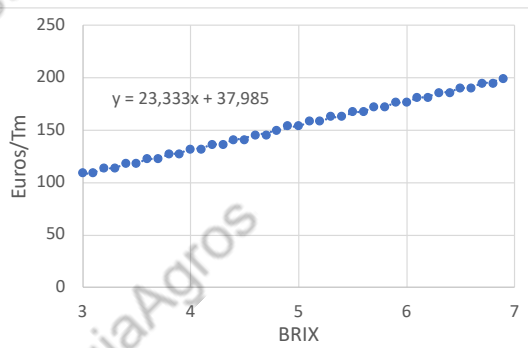
LP 0.28ha



RC 0.10ha



RDC 0.28ha



- Irridesk automatic irrigation system permits maintaining a good production with a water maximum limit set as an initial target.
- Irridesk automatic irrigation system can adjust the irrigation scheduling in the function of soil water content and improve efficient water use.
- The application of deficit irrigation during the initial cultivation phase has reduced crop development, causing a significant decrease in production.
- It is necessary to identify the most crucial phenological moments to avoid stressful situations at sensitive times. In this sense, using crop development monitoring systems with NDVI will facilitate a better adjustment of crop development to the irrigation seasonal plan.

# Thank you for your attention

## Acknowledgements:

María Borrego

Paula Muñoz

Marta Rosario

Marina Corchado

Manuela Lavado

María Belén Peña

Sonia Vidigal

Carlos Campillo Torres

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### DigiSPAC project



TED2021-131237B-C22

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