

# National Perspectives : Insights from Murcia (Spain)

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# National Perspectives : Insights from Murcia (Spain)

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**Where we live**



- Climate
- Soil
- Agricultural Heritage

**What we are doing**



- Water resources
- Water & nutrient management
- Nutrient efficiency

**What is our expertise**



- Sustainable crop production
- Adaptation & mitigation strategies-  
Managing resilience to climate change

**What does it mean**

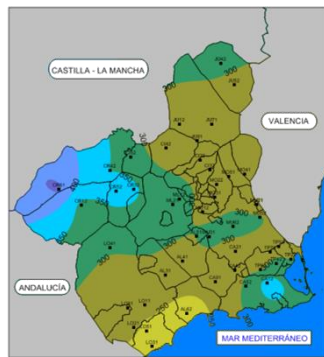


- Singularity of Murcia Region- Economic viability and competitiveness to guarantee European food needs with higher agricultural efficiency

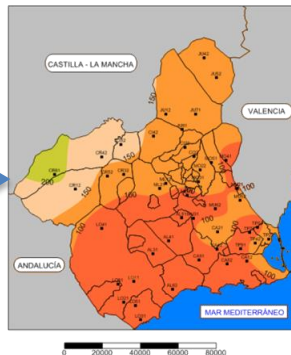
# Where we live

## ■ Climate

Arid – semi arid conditions <300 mm/year

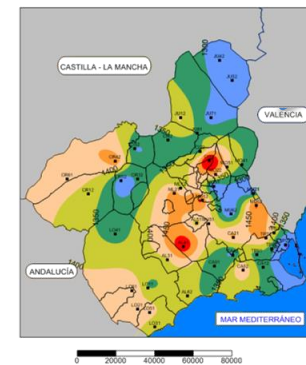


1999-2012



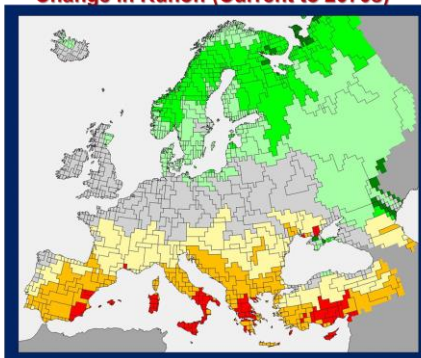
2013

Extreme drought



Evapotranspiration ( $ET_0$ )

Impact of Climate Change  
Change in Runoff (Current to 2070s)



Calculations:  
WaterGAP Model  
Climate Scenario:  
Hadley Model

Changes in  
Water Availability

decreases

- 50 %

- 25 %

- 10 %

small change

+ 10 %

+ 25 %

+ 50 %

increases

© Center for Environmental  
Systems Research  
University of Kassel

Precipitation 297 mm  
Average high T: 24.9 °C  
Average low T: 12.3 °C  
Sun hours: 2,968  
More than 300 days of  
sun/year

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# Where we live

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## ■ Soil

Very low organic matter content



Reduces biodiversity

Land degradation and erosion (extreme weather events)

Salinisation

## ■ Agricultural Heritage

Long tradition in agricultural water management (Phoenicians, Romans, Arabs)

### River Segura

It has been the basis of a long horticultural tradition

The Arabs (711 A.D – 1492 A.D.) established the first orchards with hydraulic infrastructures



Huerta landscape, transforming low-production region into places suitable for the introduction and maintenance of sustainable cultivation

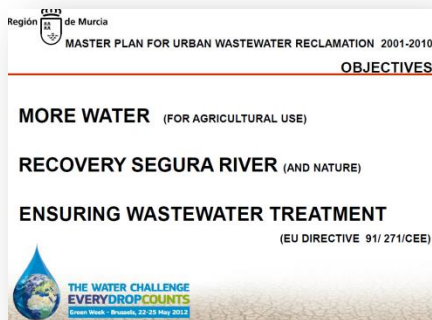
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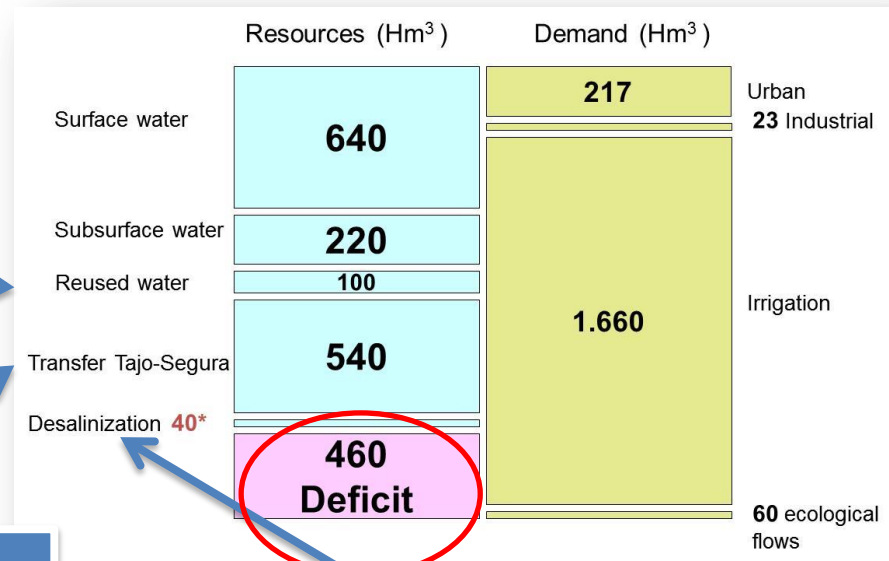
# What we are doing

## ■ Water resources

Reuse of urban wastewater for agriculture: **98%**



Water transfer: Tajo-Segura river (**286 km**)



**Irrigated area < irrigation potential**

Desalinization capability



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# What we are doing

## ■ Water & nutrient management

Foster sustainable water use and management in the different sectors

- Improvement of the irrigation systems efficiency (hydraulic efficiency)
- Improvement of the crop water use efficiency (related to the in-field water application efficiency and to crop performances)

500,000 ha cropping area

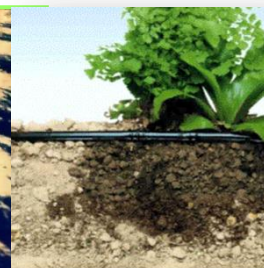
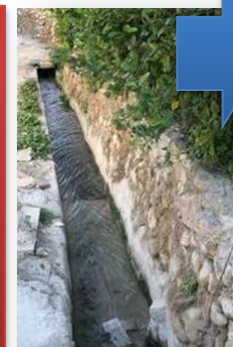
187,000 ha potential irrigation area

152,000 ha irrigated area

84% Drip irrigation

85%

modernization  
plan of  
traditional  
irrigations

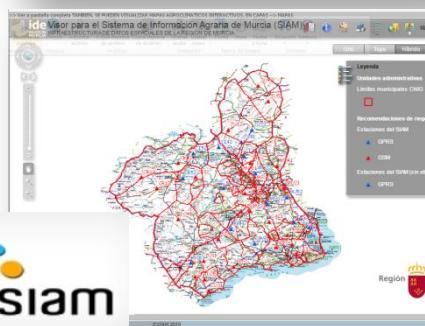


Irrigating only the root zone of the crop rather than the whole land surface, thus maintaining the water content of the root zone at near optimum levels

# What we are doing

## ■ Water & nutrient management

### Irrigation Advisory Program



45 weather stations (GPRS transmission)

Eto: reference crop Evapotranspiration

Cultivo y Variedad: [Seleccione Cultivo y Variedad] [v]

Estación: [Seleccione Estación] [v]

Suelo: [Seleccione Suelo] [v]

Datos de la Plantación

Entre Plantas: [ ] x Entre Filas: [ ] = Total: [ ] m2 Plantas por Hectárea: [ ]

Datos de la instalación

Coef. Uniformidad: 50 %

Diámetro copa(m): [ ]

Caudal Emisor(l/h): [ ]

Nº Emisores/planta: [ ]

C.E. agua(l/m): [ ]

Ajustes del Informa

Periodicidad: [Diario (dd/mm/aaaa)] [v]

Fecha Inicio: [ ]

Fecha de Fin: [ ]

SIAM 2010

Cultivo y Variedad: [Seleccione Cultivo y Variedad] [v]

Zona: [ ] Estación: [ ]

Seleccione los fertilizantes a utilizar.  
Puede consultar los programas orientativos para una adecuada combinación.

Ácido Fosfórico 72% pura

Ácido Nítrico 5%

Complejo 6-6-30

Complejo 10-5-6

Complejo 12-3-5

Complejo 12-4-6

Complejo 9-4-30

Complejo 9-3-7

Plantilla Manzanilla

Plantilla Manzanilla

Unidades

mg/litro ( ) mg/litro

CLORURO (Cl<sup>-</sup>) [ ]

SULFATO (SO<sub>4</sub><sup>-2</sup>) [ ]

CARBONATO (CO<sub>3</sub><sup>-2</sup>) [ ]

BICARBONATO (CO<sub>3</sub>H<sup>-</sup>) [ ]

NITRATO (NO<sub>3</sub><sup>-</sup>) [ ]

NITRITO (NO<sub>2</sub><sup>-</sup>) [ ]

ONCELO (Ca<sup>+2</sup>) [ ]

PAGNOSO (Mg<sup>+2</sup>) [ ]

SODIO (Na<sup>+</sup>) [ ]

POTASIO (K<sup>+</sup>) [ ]

BORO (B) [ ]

AMONIO (NH<sub>4</sub><sup>+</sup>) [ ]

SIAM 2010

Informe

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Fecha Inicio: [ ]

Fecha de Fin: [ ]

SIAM 2010

Componente	ANAL.	REAL	ANAL.	REAL
Nitrogeno (N)	2.1	1.8	1.8	1.8
Fósforo (P)	0.4	0.4	0.4	0.4
Potasio (K)	0.4	0.4	0.4	0.4
Calcio (Ca)	1.1	1.1	1.1	1.1
Magnesio (Mg)	0.4	0.4	0.4	0.4
Sodio (Na)	0.4	0.4	0.4	0.4
Cloruro (Cl)	0.4	0.4	0.4	0.4
Carbonato (CO <sub>3</sub> )	0.4	0.4	0.4	0.4
Bicarbonato (HCO <sub>3</sub> )	0.4	0.4	0.4	0.4
Nitrato (NO <sub>3</sub> )	0.4	0.4	0.4	0.4
Nitrito (NO <sub>2</sub> )	0.4	0.4	0.4	0.4
Ammonio (NH <sub>4</sub> )	0.4	0.4	0.4	0.4
Boro (B)	0.4	0.4	0.4	0.4
Acido Fosforico (H <sub>2</sub> PO <sub>4</sub> )	0.4	0.4	0.4	0.4
Acido Nítrico (HNO <sub>3</sub> )	0.4	0.4	0.4	0.4
Complejo 6-6-30	0.4	0.4	0.4	0.4
Complejo 10-5-6	0.4	0.4	0.4	0.4
Complejo 12-3-5	0.4	0.4	0.4	0.4
Complejo 12-4-6	0.4	0.4	0.4	0.4
Complejo 9-4-30	0.4	0.4	0.4	0.4
Complejo 9-3-7	0.4	0.4	0.4	0.4
Plantilla Manzanilla	0.4	0.4	0.4	0.4
Plantilla Manzanilla	0.4	0.4	0.4	0.4

- Crop
- Weather station
- Soil
- Plant density

- Fertilizers
- Irrigation water analysis

Leaf Analysis  
Interpretation

We  
know

Water  
demand

Nutrient  
demand

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# What we are doing

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## ■ Research & investment strategy

Agricultural Research Centers:



CEBAS-CSIC

Universities Agronomy studies



University of Murcia



Technical University of Cartagena



Catholic University of Murcia  
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# What we are doing

## ■ Research & investment strategy

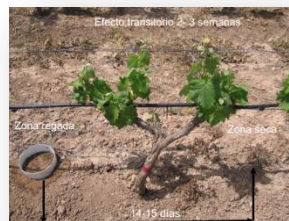
Agricultural Research Centers:

Universities - Agronomy studies



Water & Nutrient (N) efficiency

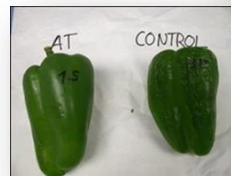
- New cultivars- Shorter production cycle (increased €/m<sup>3</sup>)
- Regulated deficit irrigation
- Partial Root Zone Drying



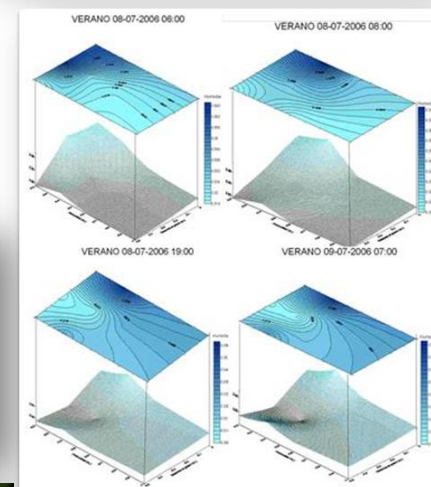
- N leaching control



- Product quality



*In situ* plant nutrient control



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Agricultural Research Centers:

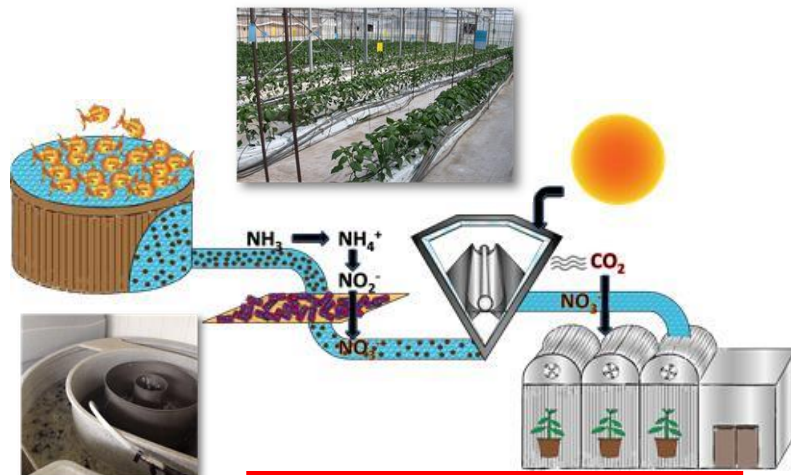
Universities - Agronomy studies

Water & Nutrient (N) efficiency



*Feedstock used:* Slaughterhouse waste and animal Carcasses; Pig manure and sewage sludge; Pruning and garden debris

*Recycling all organic materials and recovering their energy in the form of biogas and biofuels*



Recirculating Aquaculture Systems (RAS)

# What is our expertise

## ■ Sustainable crop production

Water & Nutrient (N) efficiency



Water: high cost

Organic manures: Not for free

“Agricultura limpia” program: NO pesticides used (biological control)

Food security and safety: Product traceability- Water / Carbon/ Nitrogen footprints.

Reduced or zero tillage and better management of crop residues and planting systems which enhance water and nutrient conservation



## ■ Adaptation & mitigation strategies- Managing resilience to climate change

Water & Nutrient efficiencies  
strategies

High *added-value* agriculture  
Management low quality waters

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# What does it mean?

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- Murcia has singular soil and weather conditions # Central and Northern Europe

**Our agriculture is only possible under the premises of maximum efficacy for each drop of water**

- i) No intercropping
- ii) We have to pay for manures
- iii) Mineral N leaching is controlled by specific crop water/nutrient demand (optimization programs, weather stations and drip irrigation)
- iv) N-mineralization processes from organic manures-but water/irrigation is restricted
- v) N concentration in plant tissue monitored





# Thank you

