

# CICLICA PRIMA

Smart Agriculture optimization to  
Climate Change Adaptation



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## Principal Investigator of CEBAS-CSIC at CICLICA PRIMA

**FRANCISCO PEDRERO SALCEDO**, Researcher at CEBAS-CSIC.



[linkedin.com/in/francisco-pedrero-salcedo-4a737120](https://www.linkedin.com/in/francisco-pedrero-salcedo-4a737120)

## What is the focus of CEBAS-CSIC at CICLICA PRIMA?

**Elevating crop resilience** in the face of climate change-induced water scarcity and elevated temperatures constitutes the core challenge addressed by the CICLICA project.

CEBAS-CSIC's endeavor is dedicated to **mitigating the adverse impacts of these environmental stressors on agricultural productivity**.

## Describe the role of CEBAS-CSIC at CICLICA PRIMA

Drawing upon the **extensive expertise of the Irrigation Department at CEBAS-CSIC** in water-efficient irrigation technologies, innovative agricultural practices, and the utilization of unconventional water resources, our institution is poised to assume a pivotal role in the CICLICA project.

We will spearhead the establishment of an efficient project management framework, assuming overall coordination responsibilities encompassing activity planning and rigorous monitoring across both living labs situated in Spain.

At the heart of our involvement lies a profound commitment to assembling an international and multidisciplinary team, poised to tackle the challenges of cultivating carob trees sustainably within arid and semi-arid climates.

Our ultimate objective is to produce a comprehensive guide, informed by our collective expertise, to facilitate the sustainable implementation of carob tree cultivation under irrigation in such demanding environmental conditions.

## Which are the expected impacts?

**CICLICA seeks to revolutionize carob tree cultivation** by promoting water-efficient, high-quality, and environmentally responsible agricultural practices.

Moreover, there is a growing emphasis on harnessing carob trees as a CO<sub>2</sub> sink and enhancing the landscape, thereby highlighting the pivotal role of CICLICA in **ushering in a sustainable future for carob cultivation amidst evolving agricultural dynamics**.

## How does CEBAS-CSIC do it?

CICLICA's primary objective is to elucidate the water requirements of carob tree irrigation while simultaneously optimizing production yields and fruit quality.

This multifaceted endeavor involves the implementation of various irrigation strategies and cutting-edge precision agriculture technologies. These technologies encompass digital and spectral image analysis, non-destructive on-farm sensing techniques, the integration of subsurface drip irrigation systems, and the harnessing of non-conventional water sources to ameliorate the challenges posed by regional water scarcity.

Furthermore, CICLICA extends its impact by exploring the synergistic effects of these innovative measurements when coupled with sustainable management practices. These practices encompass the application of diverse organic mulching techniques, the deployment of novel and eco-friendly superabsorbent polymers (SAPs), and the utilization of biofertilization through indigenous mycorrhizal complexes (AMF). In addition, encompasses the integration of advanced tools such as plant and soil sensors, subsurface drip irrigation, extensive mechanization, rapid entry into production cycles, and a holistic consideration of novel criteria, including minimal tillage for soil management, plant cover practices, and environmentally conscious principles such as organic farming.

## What's the importance of this work?

**CICLICA assumes a paramount role in addressing the imperative challenges associated with carob tree cultivation.**

The Carob tree, indigenous to the Region of Murcia, stands out as an exemplar of resilience in dryland farming, especially considering the emerging challenges posed by global warming, characterized by prolonged droughts and soaring temperatures. The resurgence of interest in carob cultivation is primarily attributable to its robust adaptation to these changing climatic conditions, coupled with the remarkable increase in carob prices in recent years. It emerges as one of the few viable options for dryland farming, where almond trees struggle to thrive, olive groves barely yield, and cereal crops only sporadically benefit from essential spring rains.

In light of years of diminishing arable land, including the uprooting of century-old carob specimens of immense environmental significance, new plantations are being initiated. These efforts must be underpinned by a contemporary agricultural paradigm that emphasizes precision agriculture techniques.

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