

# Smart Olive Farming in a Changing Climate: Innovation for a Resilient Future

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# American Farm School

- The American Farm School has a proud 121-year history of educational excellence. Our institution offers a full continuum of learning—from kindergarten through college—including Vocational Education and Training (VET) and Lifelong Learning programs.
- Our campus integrates hands-on agricultural experience with academic study. We operate milk-producing dairy units, facilities for Ω3 egg-laying hens and turkeys, and a diverse range of fruit orchards, olive groves, and vegetable production in both greenhouse and open-field environments.



# The Innovation HUB

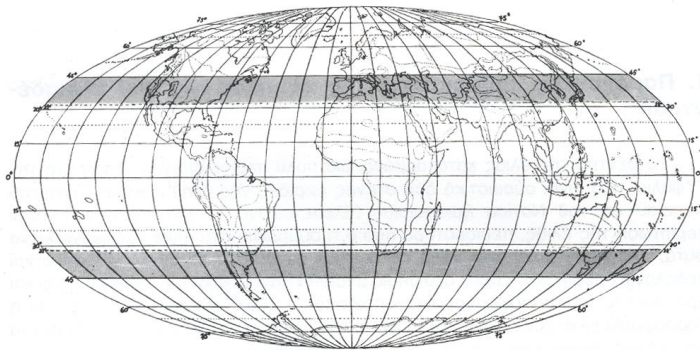
- Our Innovation HUB serves as a dedicated facilitation office, connecting the knowledge-generation activities with real-world industry needs. It acts as a bridge between research, education, and the broader economy, ensuring that innovation reaches end users and creates meaningful impact.



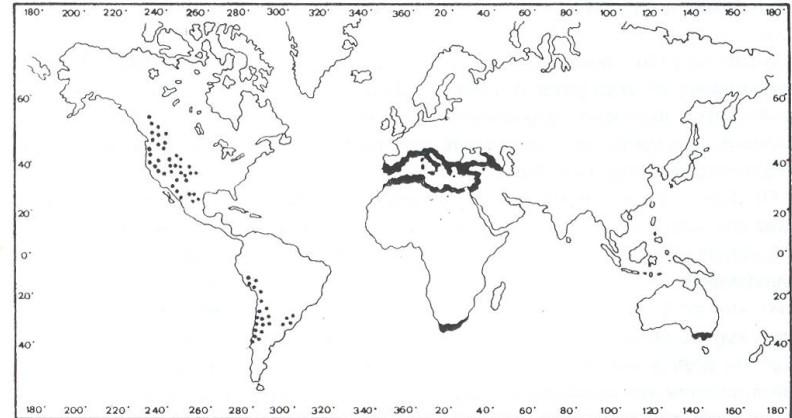
# Olive cultivation in the world

Special tree species with particular demands on climatic conditions

- As a result only narrow zones are suitable for sustainable olive cultivation

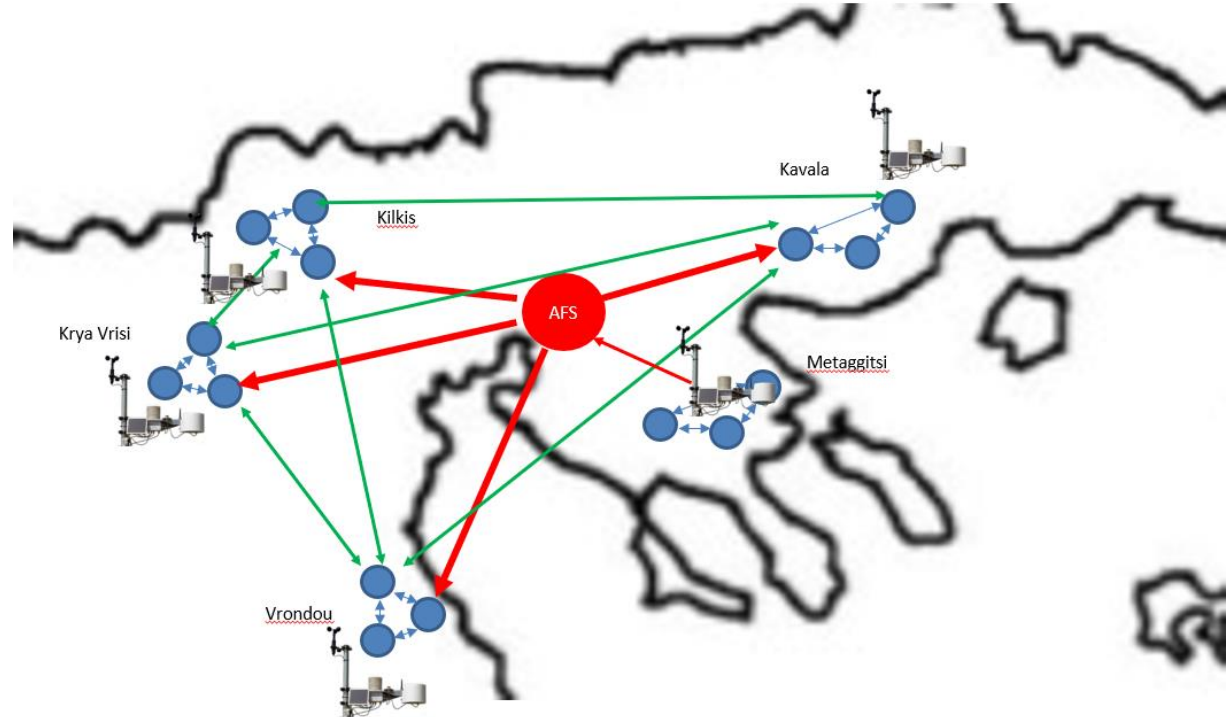


- Olive production areas in the world



## The beginning

- It all started back in 2017 when the first five meteorological stations were installed in five areas in N. Greece.
- In less than two years we have managed to create a Community of practice





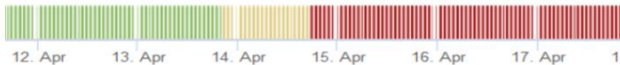
# Combined knowledge leads to correct decisions

Information > DATA > Decision making

Spraying time



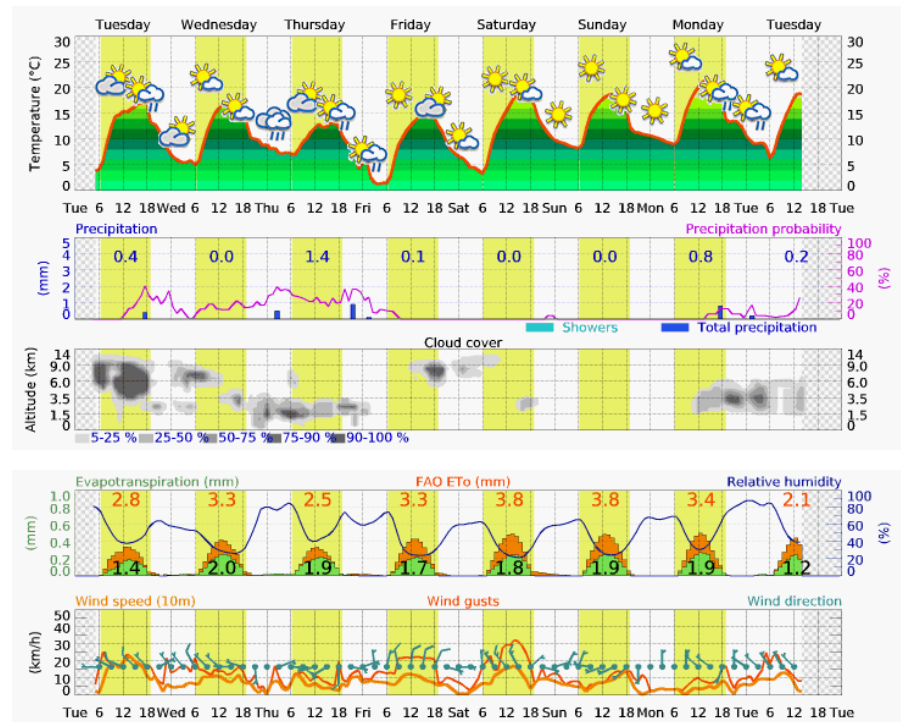
Fertilisation efficiency



Field access



Soil cultivation



# Technology Examples: Irrigation

## Olive groves soil moisture

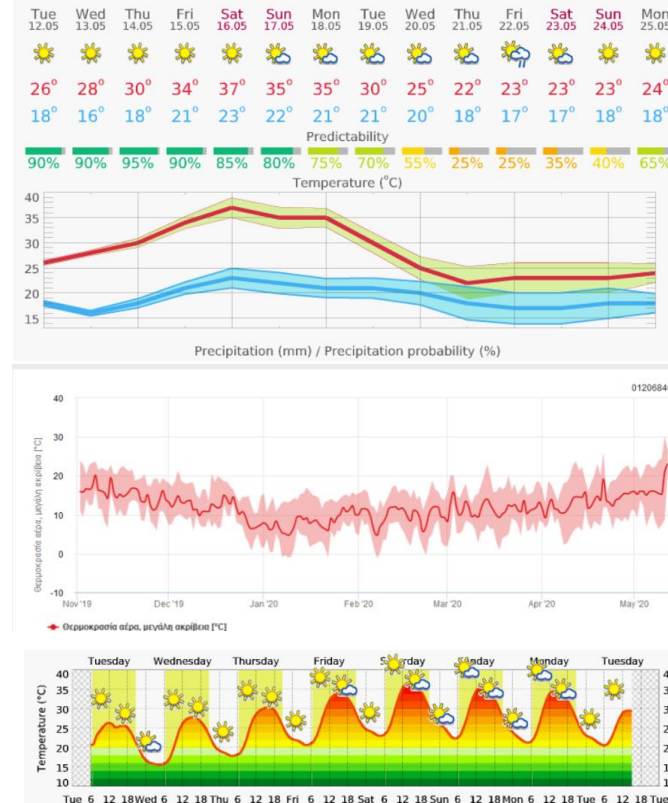
**Observation:** Different behaviour of water in the soil

**Solution:** Different irrigation protocols



# Technology Examples: Early heat waves

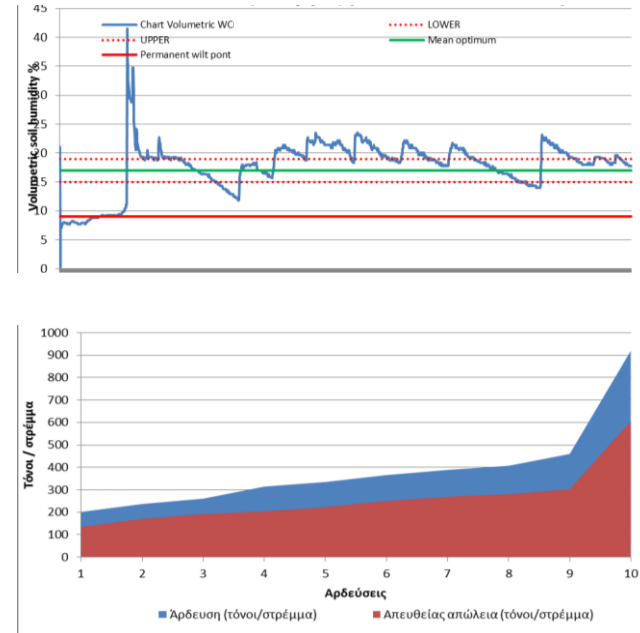
- The concern: Will high temperature hinder the fertilization of olive flowers?
- Result: The pollen tube needs about four hours to germinate and fertilize. It can do this anytime from six in the afternoon until ten in the morning. Based on the prevailing conditions and the long-term forecast, no significant damage is expected (It was verified).





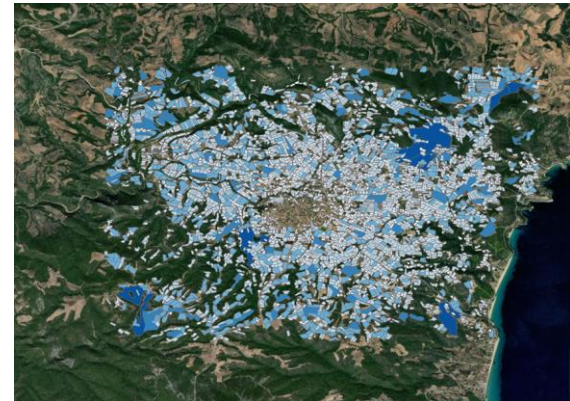
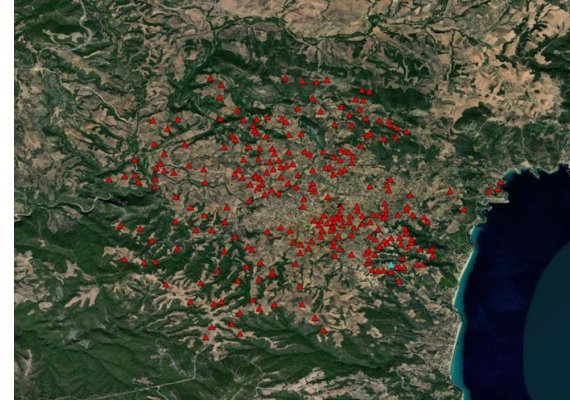
# Technology Examples: Efficient water use

- The blue line represents the soil moisture in real time
- The blue area represents the useful water quantity. The red area represents how much water was wasted during the given growing season



# Technology Examples: Irrigation water demand

- We move into the future with reliable measurements. Measuring the real needs of an entire area for each individual field.
- Prerequisite for infrastructure planning.
- Crop assurance especially in climate change era.



# Technology Examples: Sensors and field data

- Technology intensity
- Current coverage: 1M hectares
- Current Capacity: 200,000 connected devices (Connected now: several hundreds).



Robust telecommunication network



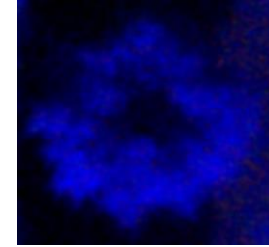
A sufficient number of smart interconnected devices

# Technology Examples: Drone imagery and AI

- Early detection of olive diseases, Verticillium



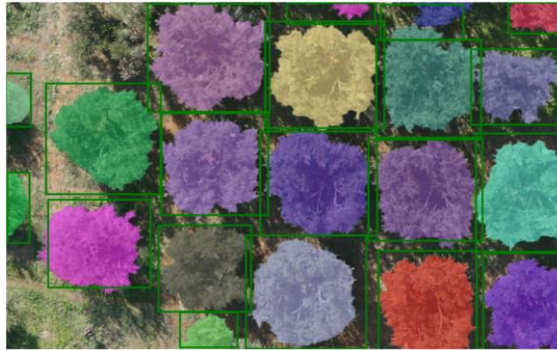
RGB



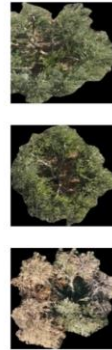
Multispectral



Thermal



Use of YOLO algorithm, Olive tree identification and algorithm training



Identification of infected olive trees in the grove

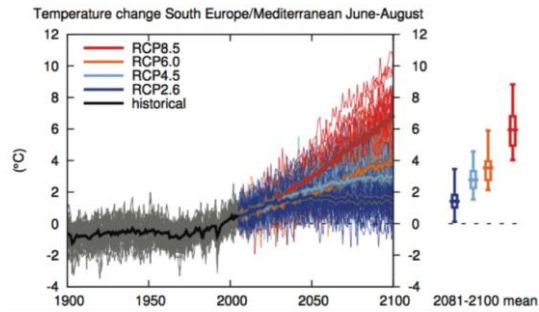


Probability of disease identification

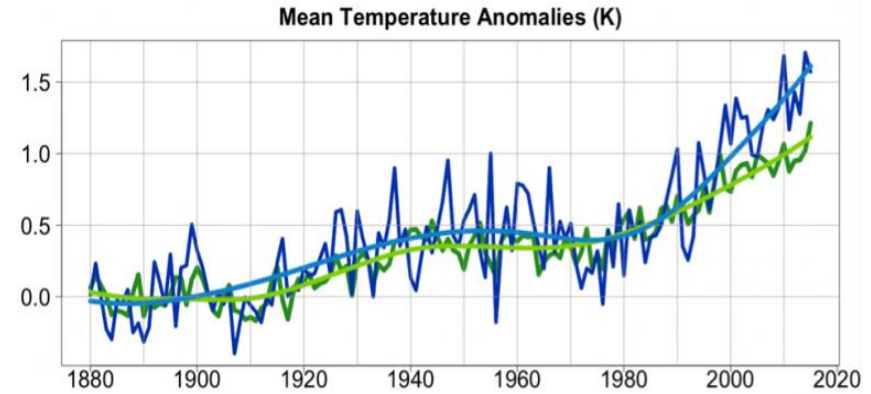
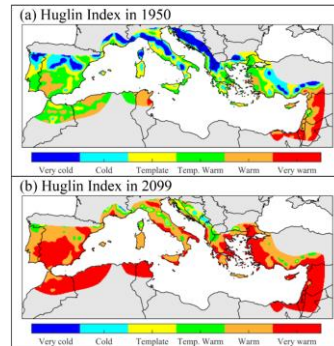


# Climate change: New challenges, are we ready

- No, we are not ready. Are we getting prepared?



Climate change scenarios



Mean temperature increase in the Mediterranean area

# Climate change: New challenges, are we ready

- Interactions: How ecosystems behave in climate change conditions

We need a new approach:

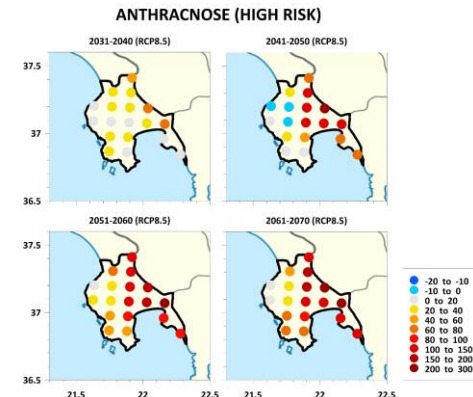
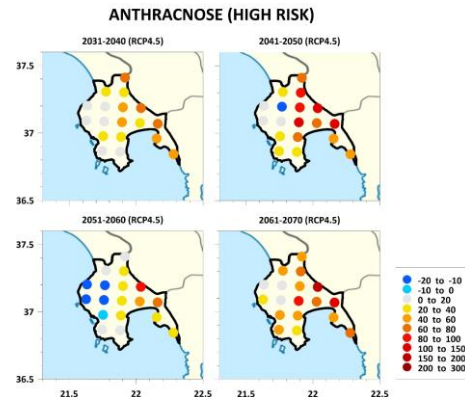
- Systems not components
- Spatial dimension studies
- A lot of observations (IoT devices)
- Rapid updates and big computational power (big data)
- Quick and reliable assessment (AI & Machine Learning algorithms)
- Infrastructure provisions and implementation

Pests

Diseases

Tree physiology

Classic studies examine these one by one





# *Thank you*

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