



ACTIVITIES & GOALS

- Map the current situation of citrus crops in Achaia, Argolida and Laconia (Peloponnese, Greece) and tree crops in Rhone Valley and Champagne (France)
- Map the needs of farmers with respect to protection from frost
- Design and develop a smart IoT-based system for monitoring selected atmospheric and agronomic parameters, forecasting frost events, and provide early warnings of adverse conditions
- Develop and implement timely responses prior to frost events using sustainable techniques with low carbon footprint to reduce the epiphytic populations of ice nucleation active bacteria under a critical threshold

DISSEMINATION & INFORMATION

- Strengthening local capacities and provide guidelines about the best agricultural practices, technologies and support services, to reduce vulnerability and enhance resilience to frost events
- Demonstrate the entire effort to several agricultural areas with different geographical and climatic characteristics
- Develop the FROSTDEFEND Adaptation Plan to promote best available techniques and environmental practices
- Increase awareness among target groups and end-users towards climate responsible attitudes

THE CONSORTIUM

The LIFE-FROSTDEFEND project is implemented by the following institutions:

- National Centre for Scientific Research "Demokritos" (NCRSD), Greece
Project Coordinator
- Agricultural University of Athens (AUA), Greece
- Agricultural Cooperatives Union Aeghion SA (ACUA), Greece
- Institut National de Recherche pour l'Agriculture, l'alimentation et l'Environnement (INRAE), Clérmont-Ferrand, France
- mSensis, SA., Athens, Greece



Forecasting and protecting fruit crops from frost damage



LIFE FROSTDEFEND

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A CHANGING CLIMATE

Climate change (CC) induced an increase in climate variability, and various harmful weather events occur at the global and regional scale with increased frequency and intensity.

CC is among the most serious challenges to society, and the need for adaptation is particularly acute, considering its impact on many communities and sectors that depend on natural resources.

Crops are sensitive to weather.

A frost event can wipe out an entire crop. Frost is responsible for serious crop losses in Greece.

During the cold periods of 2004 and 2007 severe frosts in Aeghion, Greece resulted in the complete loss of lemon production.

In France, in 2016, 2017, 2019 a combination of premature vegetation and late frost caused significant damage to fruit-tree and grape crops.

In Europe, frost-related crop losses are estimated to reach 3,3 b € per year.



THE PROJECT

The LIFE-FROSTDEFEND project aims to design, develop and demonstrate the benefits of a novel monitoring and frost forecasting tool to mitigate frost injury in tree crops. The project started in September 2021 and will last 4 years.

The budget of the project is 1,94 million €. The European Union contributes with 1,03 million € and project partners' own contribution covers 0,91 million €.



FROSTDEFEND INNOVATION

We develop a smart Internet of Things (IoT)-based system to monitor relevant atmospheric, meteorological and plant indicators in an orchard, to predict the risk for frost damage. This tool will make use of parameters monitored in real-time with cost-effective sensors to predict growth of populations of epiphytic ice nucleation-active bacteria, key factors in frost damage of crops.

Furthermore, this tool will provide reliable warnings and guidelines to farmers for simple, low cost and sustainable actions to mitigate potential frost damage to tree crops by reducing these populations ahead of an anticipated frost event.

FROSTDEFEND is based on cross-disciplinary research that covers agronomical, biological, meteorological and atmospheric sciences. The produced system will take into account:

- the mechanism of plant frost damage and the strategies that plants employ to adapt to frost
- the biology and genetics of epiphytic ice nucleation active bacteria which facilitate the development of frost on plants
- the importance of long range transport and mixing of aerosol sources over the Mediterranean basin
- the properties of atmospheric aerosols leading to ice nucleation