# LIFE FROSTDEFEND

**Newsletter #3**

**October 2023**

LIFE20 CCA/GR/001747

# Epiphytic bacteria and frost

- Epiphytic bacteria are saprophytes and phytopathogens residing on the aerial parts of plants, including leaves, flowers, buds, and fruits. Freezing injures aerial plant parts, providing these bacteria with nutrients and access to the interior of the plant.

- One type of such bacteria that we are studying *is Pseudomonas syringae*. *P. syringae* is an efficient catalyst of ice formation from supercooled water, because it produces ice nucleation active (INA) proteins. On the plant it causes freezing of water at relatively high temperatures (slightly below °C), resulting in plant frost damage.

- Ice nucleation active bacteria and other types of biological material are presumed to also act as atmospheric ice nucleators involved in the formation of precipitation in clouds.

https://commons.wikimedia.org/wiki/File:Pseudomonas_syringae_a2_(4).jpg

# *Pseudomonas syringae* on plants

- *Pseudomonas syringae* overwinters on infected plant tissues, including necrotic or gummosis regions, and even in healthy-looking tissues.
- In spring, wet or dry deposition can disperse the bacteria onto newly grown leaves and blossoms, where they thrive throughout summer.
- When epiphytic, *P. syringae* grows and spreads without causing disease. Upon entering the plant through stomata or injuries, the bacterium may initiate plant diseases. The pathogen exploits intercellular spaces, causing leaf spots and cankers on various plant hosts.

# The Portable Ice Nucleation Experiment (PINE) in Aeghion

The Portable Ice Nucleation Experiment (PINE) instrument of the Atmospheric Aerosol Research group at the Karlsruhe Institute of Technology (Germany) was shipped to Aeghion and operated at our Valimitika experimental lemon orchard from March 27 to May 7.

This is a state-of-the-art instrument to monitor airborne ice nucleating particles in a continuous mode and in real time.

We investigated the presence, number and activity of ice forming particles in the atmosphere of the orchard; ice forming particles immigrating at or emigrating from agricultural sources.

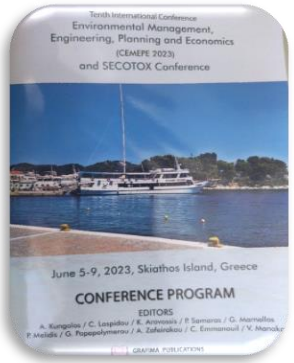
This is one of the few studies of its kind worldwide. The ongoing analysis of data will shed light into the relationship between ice nucleating particles of biological and inorganic origins on the plant surface and in the atmosphere of an orchard

# The Portable Ice Nucleation Experiment (PINE) in Aeghion

State-of-the-art research on atmospheric ice nuclei emitted from an agricultural area near Aeghion, Greece, using the Portable Ice Nucleation Experiment (PINE) instrument of the Karlsruhe Institute of Technology, Germany.

# Dissemination and Networking

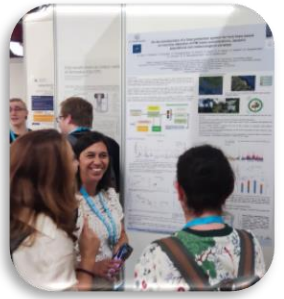
## LIFE-FROSTDEFEND @ Tenth CEMEPE & SECOTOX Conference




Dr. Maria Gini (NCSR Demokritos) presented the research paper "Investigating the temporal variability of PM mass concentrations, bacteria populations and meteorological variables at citrus orchards" at the 10th International conference on Environmental Management Engineering planning and Economics (CEMEPE) & SECOTOX Conference taking place in Skiathos island!

## LIFE-FROSTDEFEND @ European Aerosol Conference 2023

The LIFE-FROSTDEFEND project was presented at the European Aerosol Conference in Malaga, Spain (3-8/9/2023), with a poster entitled “On the development of a frost protection system for fruit trees based on real time detection of PM mass concentrations, bacteria populations and meteorological variables”. This event brings together aerosol scientists, researchers, and industry experts from around the world to exchange knowledge and insights in the field of aerosol science. Recent advances on atmospheric aerosols, indoor aerosols, health effects, aerosol technology, instrumentation or basic aerosol processes form the main core of the conference topics.



# Dissemination and Networking

## 58th Summer School @ NCSR Demokritos


The "summer school" of the NCSR Demokritos took place for the 58th year (July 10-14). For one week, hundreds of university students in Science and Technology filed have the opportunity to attend lectures and visit the research laboratories of the Center.

During the Summer School, our project LIFE-FROSTDEFEND was showcased as an example of how aerosol science and technology can be applied in the agriculture sector.

Several students visited the facilities of the ENRACT laboratory (INRASTES), where they were informed about our current research activities in the field of climate change and atmospheric air quality.

# Dissemination and Networking

## LIFE-FROSTDEFEND @ EU CAP Network workshop

LIFE-FROSTDEFEND, represented by Dr. Konstantinos Eleftheriadis (Coordinator of the LIFE-FROSTDEFEND project), was invited to participate in the EU CAP Network workshop "Enhancing food security under changing weather patterns: farm adaptation“ that took place on 15 and 16 March 2023.


### Overall aim of the workshop

- Exchange knowledge on successful practices, opportunities and tools relevant for adapting farming to changing weather patterns, while increasing farm resilience and enhancing cooperation at both farm and local level
- Identify challenges and explore potential solutions for dealing with changing weather patterns related to climate change
- Find and share innovative solutions and enhance knowledge on farm adaptation to changing weather patterns.
- Identify needs from practice and possible knowledge gaps that may be filled by research
- Promote networking among EIP-AGRI Operational Groups and other type of innovative projects, Horizon Europe multi-actor research projects and relevant stakeholders

# Dissemination and Networking

- **LIFE-FROSTDEFEND @ 5th International Exhibition Verde.tec**


**LIFE-FROSTDEFEND participated in the Verde.tec Fair and Verde.tec forum from 17 to 19 March in Athens, Greece. Verde.tec is among the most important environmental technologies events in Greece. The LIFE-FROSTDEFEND project participated in the LIFE session and networking event organized by the NEEMO EEIG LIFE team! Dr. Maria Gini from NCSR-D presented the project in the LIFE pitch session on Saturday 18th.**

**The participants visited the LIFE exhibition stand learned about the LIFE Programme 2021-2027 and its four sub-programs: nature and biodiversity, circular economy and quality of life, climate change mitigation and adaptation, and clean energy transition.**

## Upcoming Conferences:

**LIFE-FROSTDEFEND participation at the 31st Conference of the Greek Society for Horticultural Science (EEEO) from 29 October to 2 November 2023 in Heraklion.**

**LIFE-FROSTDEFEND will be presented at the 10th International Conference of Mikrobiokosmos from 30 November to 2 December 2023 in Larissa.**

# LIFE FROSTDEFEND

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**Life-FrostDefend**

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