lifegaiasense

LAYMAN'S REPORT

The project LIFE GAIA Sense is co-funded by the LIFE Programme of the European Union under contract number LIFE17 ENV/GR/000220

ABOUT THE LIFE PROGRAMME

Introduced by the European Union in 1992, this programme deals with co-funding for projects on environmental issues proposed by member countries.

OBJECTIVES

The programme aims to promote an economy with a more efficient and sustainable use of environmental resources, reduce CO2 emissions, reduce climate change, improve environmental quality, combat the degradation of ecosystems, and pursue better environmental legislation.

BENEFICIARIES

Enterprises (small, medium, and large), public-sector organisations and research centres, and privatesector non-profit organisations (NGOs, NPOs).

The LIFE GAIA Sense project is part of the Life programme.

lifegaiasense

PROJECT TITLE: Innovative Smart Farming services supporting Circular Economy in Agriculture

DURATION: 1st July 2018 – 30ty June 2022

EU FINANCIAL CONTRIBUTION: 1,751,574.00 euros

Project Coordinator

NEUROPUBLIC

NEUROPUBLIC SA PLIROFORIKIS & EPIKOINONION

Partners

Aristotle University of Thessaloniki (Greece)

Confederação Nacional das Cooperativas Agrícolas e do Crédito Agrícola de Portugal CCRL (Portugal)

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1. INTRODUCTION

The main objective of the LIFE GAIA Sense project was to demonstrate gaiasense, an innovative "Smart Farming" (SF) solution that aims at reducing the consumption of natural resources, as a way to protect the environment and support Circular Economy (CE) models. More specifically, this project launched 18 demonstrators across Greece, Spain and Portugal covering 9 crops (olives, peaches, cotton, pistachio, potatoes, table tomatoes, industrial tomatoes, almonds, kiwi) in various terrain and microclimatic conditions. They demonstrated an innovative method, based on high-end technology, which is suitable for being replicated and is accessible and affordable to Farmers either as individuals or collectively through Agricultural Cooperatives.

Moreover, LIFE GAIA Sense aimed to promote resource efficiency practices in SMEs of the agricultural sector and eventually, contribute to the implementation of the Roadmap to a Resource Efficient Europe. This project demonstrated a method on how the farmer will be able to decide either to use or avoid inputs (irrigation, fertilizers, pesticides etc.) in a most efficient way, without risking the annual production. The focus was on the resource consumption reduction side of CE, and the results are both qualitatively and quantitatively, considering the resources' efficiency in agricultural sector.

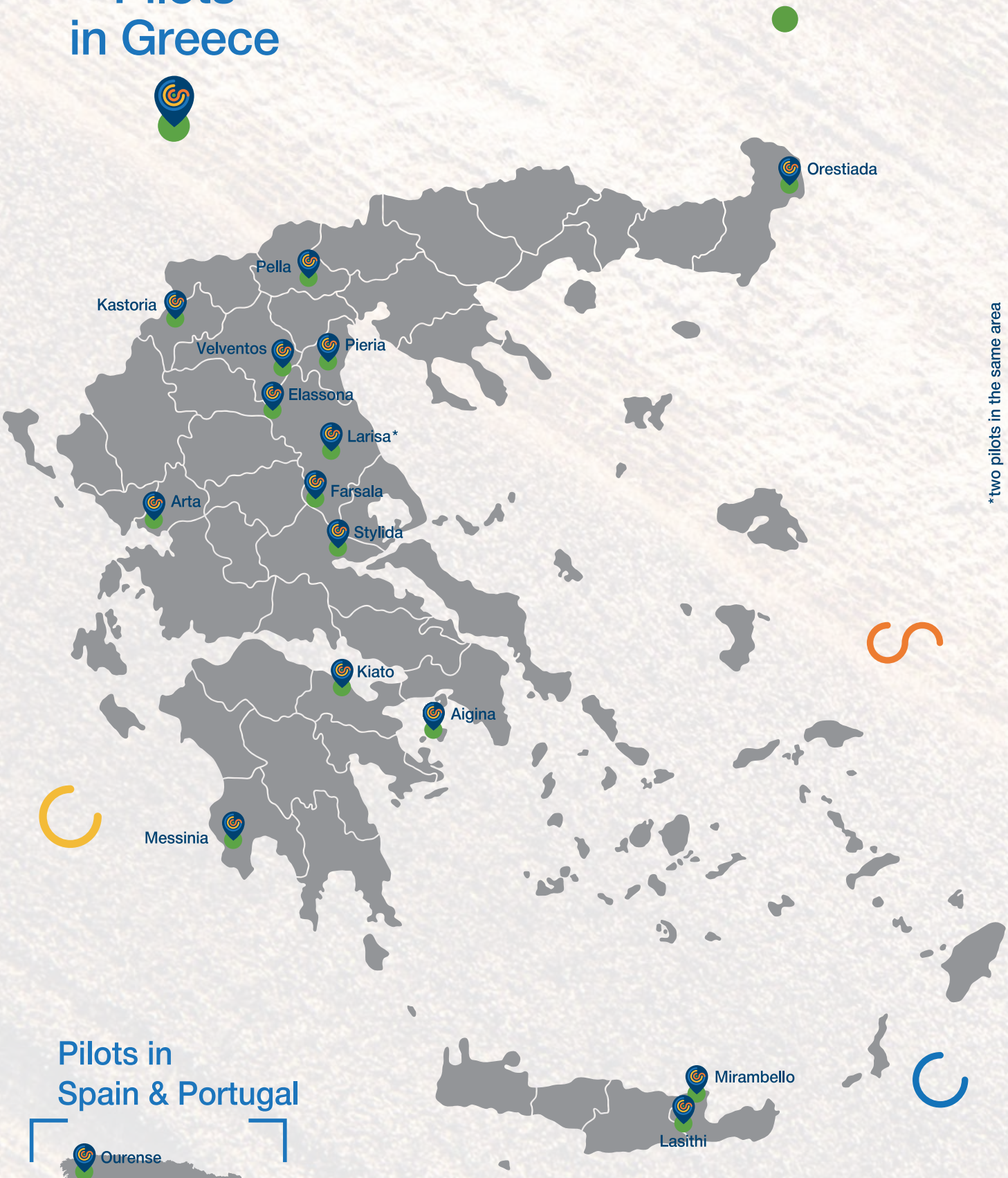
LIFE GAIA Sense SF infrastructure:

18
pilot sites in Portugal, Spain and Greece

9
different crops

70+
gaiatrons and sensors installed

Pilots in Greece



*two pilots in the same area

Pilots in Spain & Portugal









2. METHODOLOGY

The gaiasense system is a Greek innovation that combines information technologies with agronomic science in a holistic way. gaiasense is pioneering at a European level in the field of smart farming. It enhances and optimizes the decision making and precise applications in agricultural crops no matter how small or large scale they are.

Gaiasense solution is based on an infrastructure of IoT devices called GAIAtrons. GAIAtrons are telemetric environment sensing stations which are installed in the field and record atmospheric and soil parameters. The data collected from GAIAtrons are combined with data from other sources (i.e. weather forecast services and satellites images) with the help of our cloud platform and they are converted into facts using advanced data analytic techniques. The embedded Decision Support System transforms facts into an initial advice, which is accessible to farmers through the apps and certified agricultural advisors, which are employed by our business partners. The advisors are reviewing and evaluating the given information for providing the final advice and support to the farmers.

Gaiasense is a complete Production Management System (PMS) receiving and processing data from 4 different dimensions. It collects data from the field, the satellite, the scientist, and the farmer, and provides the tools to the agricultural advisor, the researcher and the farmer in order for them to take advantage of every opportunity to produce better, more and economical agricultural product.

Remote

gaiasense remote collects, processes and exploits information for every part of the parcel.

The information is acquired from sources such as satellites, aircraft and other aerial vehicles that are equipped with state-of-the-art image capturing systems. The gaiasense remote dimension is utilized to allow gaiasense and its users have a detailed and up-to-date picture of the plant's vitality and the status of the soil.

The status of the plants and soil is represented in the form of indices which value change in space and time, such as vegetation / health plant indices (NDVI), indices of the soil's water status (NDWI), etc. These indices can be used along with information from the gaiasense field dimension, referring to atmospheric and soil and other records in the gaiasense farm and gaiasense eye dimensions that are related to the cultivation activities of the producer and observations that are acquired through the field respectively.

Field

gaiasense field offers valuable information by recording, analyzing and interpreting atmospheric and soil data at specific points within the fields every time it passes, uninterruptedly.

These data are collected by the gaiatron telemetric stations, which are installed at selected points of selected parcels in order to be representative for each crop of a whole area.

Gaiatron stations are manufactured, installed and operated by gaiasense, without any financial burden for co-operating producers or agricultural advisors. They are designed and developed specifically for the needs of the gaiasense services and are part of an extensive Pan-Hellenic network that measures the environmental parameters.

The density of the gaiatron atmo atmospheric measurement stations's network is such that at least one station corresponds to each type of crop in each microclimate zone, no matter how small that zone is. Accordingly, the density of the gaiatron soil measurement stations' network is such that for each soil area and for each crop there is a station.

Eye

gaiasense eye allows information to be recorded by agricultural consultants and producers in the field.

The information is related to the state of cultivation, through field observations and sampling.

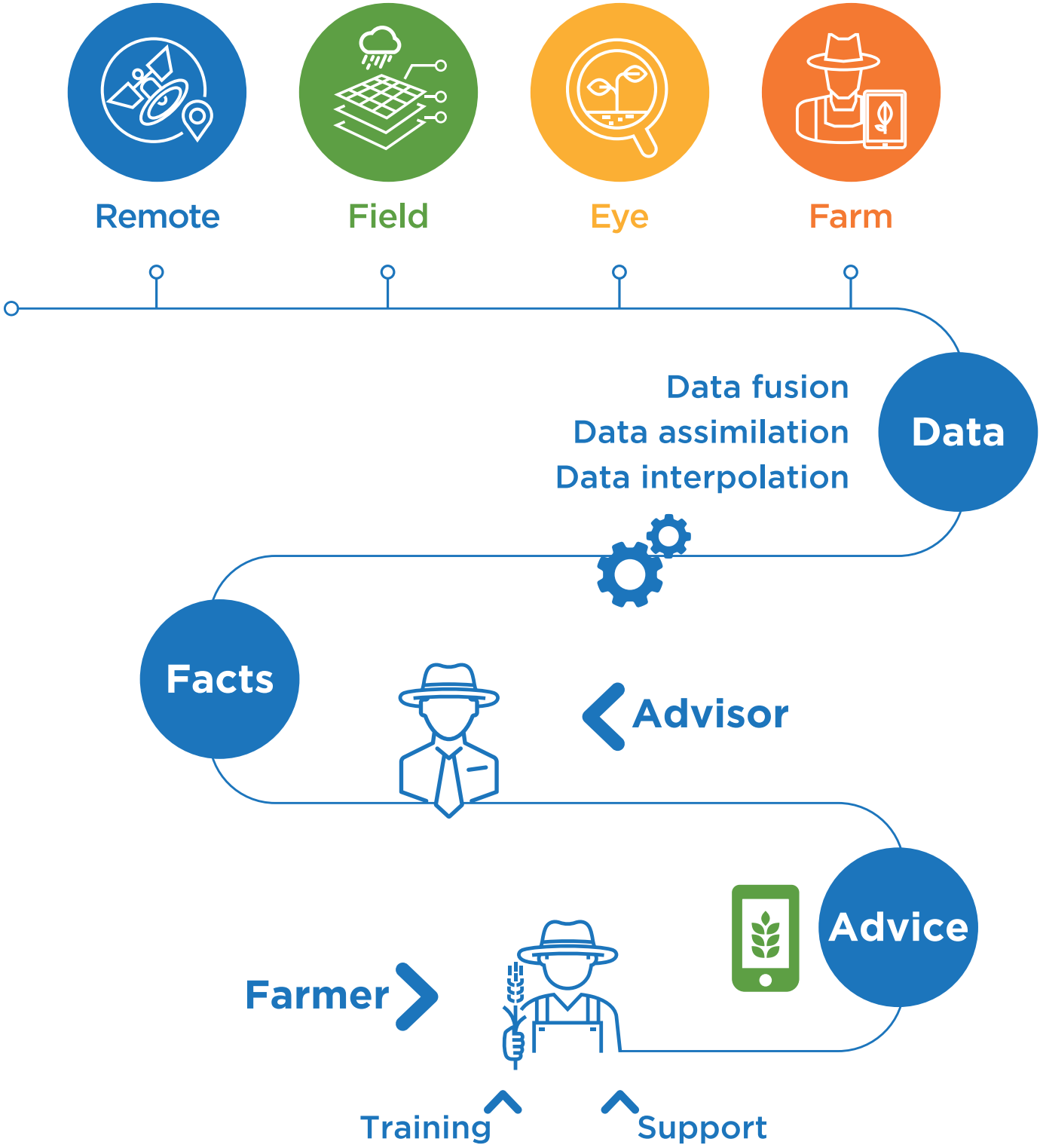
With gaiasense eye, the producer or agricultural advisor makes several observations during their field visit using gaiasense's specially designed smartphone applications. Such information includes observing symptoms of infection or infestation, counting insects in insect traps, etc., but also data that come from analysis such as soil and leaf sampling.

Farm

gaiasense farm is a very important dimension of recording the actions that the producer takes in his field and crop.

In order for the user to make the most of the benefits gaiasense can give to the crop of a particular field, the farmer who cultivates the field should become part of the exploitation of the gaiasense farm.

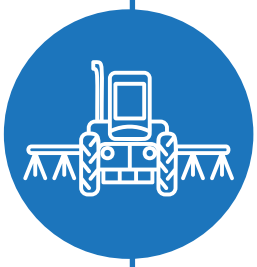
gaiasense offers the information system to record all information that is related to the daily cultivation work of the producer such as fertilization application, plant protection, time and duration of irrigation. This is the full and detailed picture of the exploitation, which contributes significantly to the decision-making process.



From data acquisition to SF services

Irrigation SF advice

- To identify the appropriate time for irrigation
- Calculation of the optimal irrigation dose



Crop management SF advice

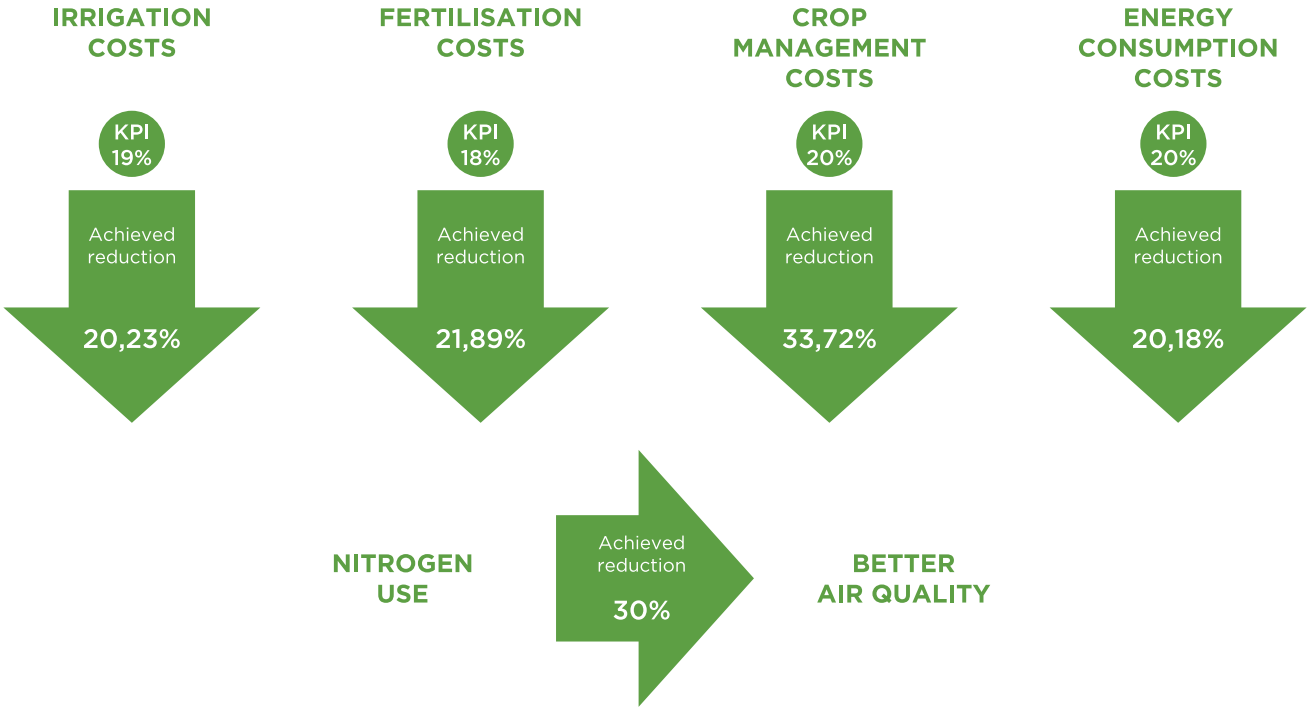
- Agricultural warnings
- Diagnosis of diseases and recognition of entomological infections
- Pest control

Fertilization SF advice

- Accurate determination of plant's nutrient needs
- Avoidance of over-fertilization & under fertilization

3. RESULTS

1. A large scale SF infrastructure for data collection and analysis supporting 18 demonstrators of gaiasense SF solution in Portugal, Spain and Greece.
2. The extension of the SF services (Fertilization advice, Irrigation advice, Automated irrigation and Hazard warnings) to cover 9 crops (olives, peaches, cotton, pistachio, potatoes, table and industrial tomatoes, almonds, kiwi) with high regional value and a variety of terrain and microclimatic conditions, in 3 EU countries.
3. A close to market, thoroughly tested and replicated SF method for a more efficiently use of resources in agricultural sector.
4. Positive socio-economic impact due to the increase of farmer's income and the friendly environmental use of resources. Income will increase since the cultivation cost is lower, even without a product price increase. Meanwhile, the quality of the product is better (less use of chemicals) ensuring consumers' protection.
5. Sustainability of resources for future generations and environmental protection with an estimated deduction of greenhouse gas emissions (GHG) equal to 32%.
6. A network of well-educated farmers, cooperatives, professionals and specialists who will take advantage on the SM model, across EU.
7. A fully functional and applicable model of circular economy, considering the use of resources in the agricultural sector, rather than the management of the outputs.
8. Policy uptake over cultivation risk management, implementation of CE in agricultural sector and contribution to EU targets about CE

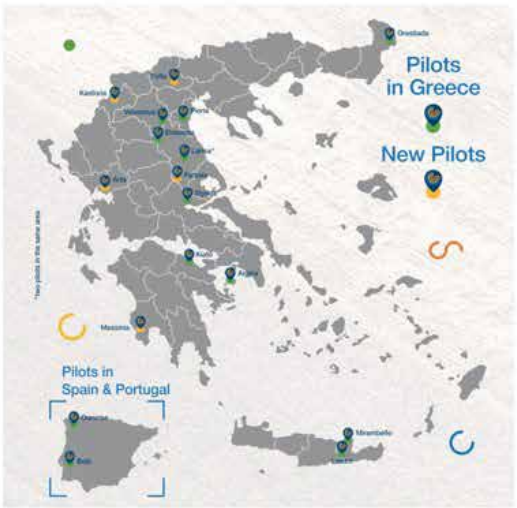


4. LONG-TERM SOCIO-ECONOMIC IMPACT

LIFE GAIA Sense formed a new market and created new jobs for the deployment of gaiasense solution, “train” a new market and create new jobs in order to satisfy the demand. The project increased further investments in order the full-scale deployment of the Smart Farming solution to take place. It trained end-users, mostly farmers and agronomists, and helped them to acquire new skills and use gaiasense solution to boost their business.

Moreover, project has a positive socio-economic impact due to the increase of farmer’s income and the friendly environmental use of resources. Income increased since the cultivation cost is lower, even without a product price increase. Meanwhile, the quality of the product is better (less use of chemicals) ensuring consumers’ protection.















5. SMART FARMING SERVICES FOR A RESOURCE EFFICIENT EUROPE

The project demonstrated a management approach, based in Smart Farming (SF) Technology, for better use of resources in the agricultural sector, in support of EC resource efficiency related policy and legislation, including the Roadmap to a Resource Efficient Europe. The main purpose is to offer reliable advice to farmers in order to use resources in a more efficient and sustainable way. Moreover through the adoption of gaiasense, a significant reduction of fertilizers, water, energy, greenhouse gas emissions/nitrous oxide, air pollution and other dangerous substances may be achieved.

In addition to this, the project supports the link between the environment and health, by minimizing the use of chemicals, thus helping the production of safer food and reducing the pollution of freshwater that could lead to serious health problems.

Overall, this project presented a very efficient and realistic tool for implementing the EU policies in the areas of water, waste and air, reducing the effect of the agricultural sector over the major environmental problems.

6. Communication

Different communications actions have taken place during the lifetime of the project:

Conferences/Fora & symposia

- 5th Panhellenic Congress on the Development of Greek Agriculture - October 25th, 2018 – Heraklion, Greece
- 6th Panhellenic Congress on the Development of Greek Agriculture - October 25th, 2019 -Athens, Greece
- 7th Panhellenic Congress on the Development of Greek Agriculture - November 6th, 2020 - online
- BioHorizon SC2 and KET-B Brokerage Event, July 4th, 2019- Brussels
- 37th International Technical Meeting on Air Pollution Modelling and its Application, 23-27 Sept 2019 - Hamburg, Germany
- 12th International Conference on Air Quality – Science and Application - March 9 -13, 2020 - online
- 6th International Symposium on Green Chemistry, Sustainable Development and Circular Economy – October 8-20, 2019 - Athens, Greece.
- 19th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, June 3-6, 2019 – Bruges, Belgium
- Harmo 20 - June 16th, 2021 - Tartu, Estonia
- Athens Circular Forum II, May 31st - June 1st, 2021 – Athens, Greece
- 12th International Agriculture Symposium "Agrosym 2021", October 7-10, 2021 - East Sarajevo, Bosnia, and Herzegovina
- 5th Global Food Forum, November 15th & 16th 2021 - Brussels
- SFCOLAB International Wednesday's Meeting, June 30th, 2021 - online
- IV Agriculture Forum 4.0, June 29th, 2022 - Torres Vedras, Portugal
- 8th Panhellenic Congress on the Development of Greek Agriculture – June 30th & July 1st 2022, Athens, Greece

Exhibitions

LIFE GAIA Sense at **Zootechnia** International fair for livestock & poultry, 31 Jan - 3 Feb 2019, Thessaloniki, Greece

LIFE GAIA Sense at **38th OVIBEJA,** 24 April - 25 April 2019, Beja, Portugal

LIFE GAIA Sense at **AgroSemana,** the Portuquese Northern Agricultural Fair, 29 Aug - 1 Sept 2019, Póvoa de Varzim, Portugal

LIFE GAIA Sense at the **28th Agrotica** International fair for Agricultural Machinery, Equipment & supplies, 30 Jan - 2 Feb 2020, Thessaloniki, Greece

LIFE GAIA Sense project at **Feira Nacional da Agricultura** National Agricultural Fair of Portugal, 9 June - 13 June 2021, Santarém, Portugal

LIFE GAIA Sense at **53th Agro** International Trade Fair for Agriculture, Cattle Breeding & Food 16 Sept 2021, Braga, Portugal

Workshops

1. LIFE GAIA Sense at workshop “The application of the new CAP and Innovation in the agricultural sector” co-organized by the City Council of Pinhel, CONFAGRI, INOVA+ and project Greenlight. Pinhel, Portugal 9 Aug 2021.

2. LIFE GAIA Sense at workshop “The application of the new CAP and Innovation in the agricultural sector” organized by CONFAGRI, in cooperation with Agricultural cooperative Beja e Brinches, the Mutal Agricultural Credit Bank, INOVA+ and project Greenlight, July 2021, Serpa.

3. LIFE GAIA Sense at “Sustainable experiences in the vineyard: NOVATERRA Project and LIFE GAIA Sense Project” 16 Dec 2021 that was held at University of Burgos – Higher Polytechnic School in Campus Rio Vena of Burgos, Spain. (Vina Costeira)

4. LIFE GAIA Sense project at the workshop “The LIFE Programme and SMEs: Challenges for sustainable business solutions focusing on the environmental conservation” 23 March 2021,
organized by the Hellenic Ministry of Environment and Energy, the Green Fund, the Greek LIFE Task Force and skyworker.

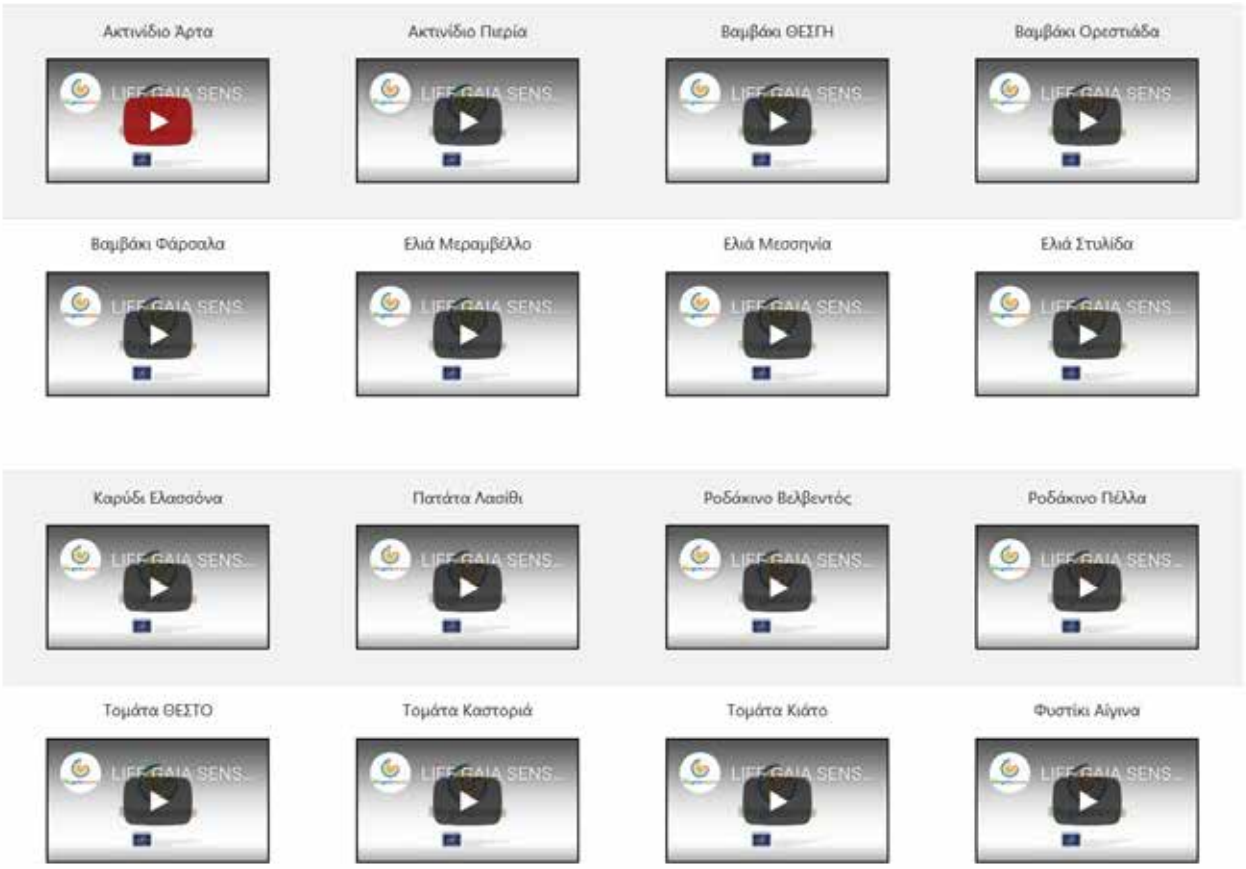
5. LIFE GAIA Sense project at LIVINGAGRO, 16-17 Dec 2021, organized LIVINGAGRO project is co-financed by the European Union (90%) through the ENI CBC Med Programme 2014 – 2020

6. LIFE GAIA Sense at Copa-Cogeca’s Working Party on Research and Innovation, 23rd September 2019

7. LIFE GAIA SENSE at 7th National Meeting of Technicians, 27th to 29th of January 2021, online organized by CONFAGRI

8. LIFE GAIA SENSE at 8th National Meeting of Technicians,
On February 3, 2022, online organized by CONFAGRI.

Webinars



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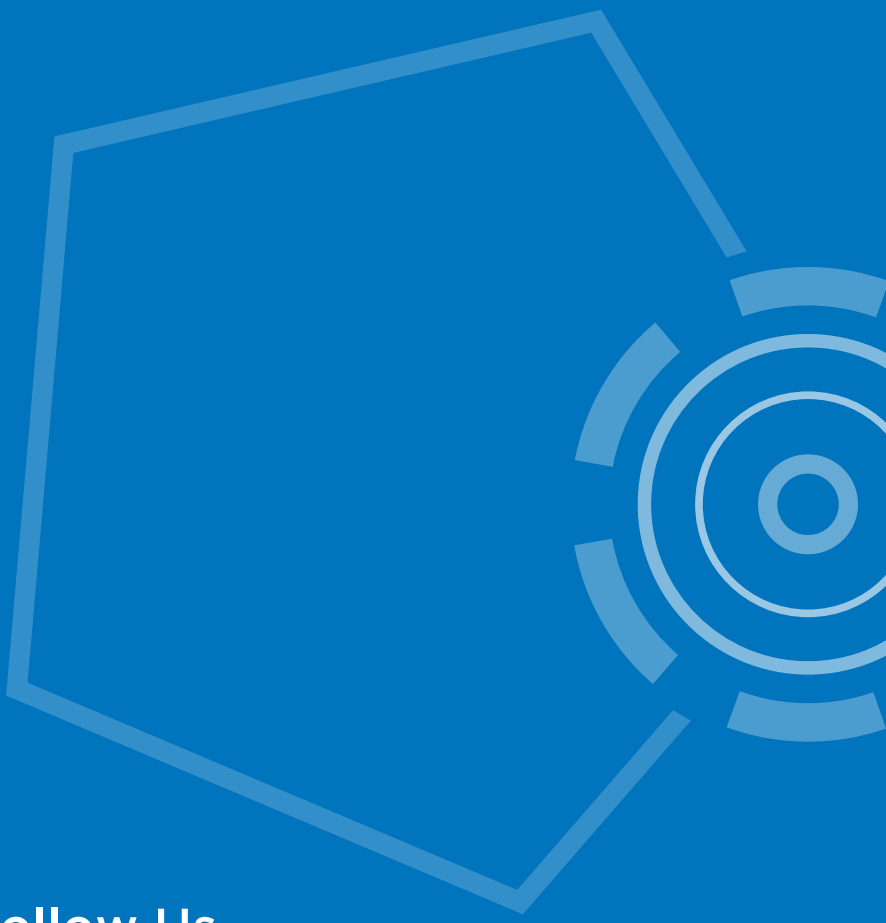

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