



## Yearly informative newsletter for the project

# “INTRODUCTION OF NEW OLIVE CROP MANAGEMENT PRACTICES FOR CLIMATE CHANGE MITIGATION AND ADAPTATION”.



## Editorial

oLIVE-CLIMA project (LIFE 11 ENV/GR/942), a five-year initiative that began in October 2012, is entering its final year of implementation.

The oLIVE-CLIMA project, part-funded by the EU's LIFE programme, is developing and applying new olive crop management practices focused on climate change adaptation and mitigation. The project seeks to enhance the long-term storage of carbon dioxide in the soil by increasing the rate of organic matter build-up and to improve soil fertility, reducing the need for artificial fertilisers.

Regarding its objectives' attainment and despite the fact that the project is still under implementation, mid-term project results are encouraging. Project applications have a positive impact both on the reduction of GHG emissions from olive crop management practices, as well as in enhancing the long-

term storage of carbon dioxide in the soil and in the plants. Applications are continuing in the final implementation year and final results will be collected.

One of the project's main achievements in the past year has been meeting the Alternate Minister of Rural Development and Food in Greece, Mr. Markos Mpolaris, to examine the project's contribution to improving the quality and sustainable management of the olive crop that coincided with the ministry's interest in seeking fresh ideas for environmentally-friendly agriculture, as part of the Greek national programme for rural development running up to 2020.

In addition, project partners have been active in the Product Environmental Footprint Category Rules determination for olive oil. One of the peaks in the project's implementation this year has been the participation of two project

partners (namely RodaxAgro and DiCEM) in a meeting held by the Technical Secretariat of the PE-FCR for olive oil in Ispra, Italy. During the meeting oLIVE-CLIMA case for storage of carbon in soil was presented.

Moreover, Institute of Olive Tree, Subtropical Plants and Viticulture has also been very active in the discussion about the application of Olive Mill Waste in olive orchards. It has stimulated the interest of Decentralized Administration of Crete, among others, for the project. Promoting the practice in the respective ministries will be at the cornerstone of the project's dissemination efforts for next year.

Needless to say that the main communication event foreseen for next year is the International Conference that will be held in Chania, Crete, from 30/8 to 1/9/2017. The Conference is





organized in cooperation with renowned scientific entities of Crete of nationwide and international reputation. The agenda and website of the Conference have been available already and a call for abstracts has already been launched. Finally, four seminars are foreseen for next year, in Northern, Central and Southern Greece, as well as in Italy. The seminars will be held

under the aegis of the Institutes of the Department of Agricultural Research (former N.AG.RE.F.) of the Hellenic Agricultural Organisation "DIMITRA" taking part in the project. They represent a unique opportunity for farmers to become acquainted with the project and its applications. Moving on to the final year of a very interesting project that LIFE

Programme has given us the opportunity to implement and hoping to see as many of you in the events that we plan,

Ms Eftichia Kivrakidou  
Project Manager

ANATOLIKI S.A.  
Development Agency of Eastern  
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**THE LIFE PROGRAMME**

The LIFE programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. LIFE began in 1992 and to date there have been four complete phases of the programme (LIFE I: 1992-1995, LIFE II: 1996-1999, LIFE III: 2000-2006 and LIFE+: 2007-2013). During this period, LIFE has co-financed some 3954 projects across the EU, contributing approximately €3.1 billion to the protection of the environment.

► Read more: <http://ec.europa.eu/environment/life/>

**THE PROJECT OLIVE-CLIMA**

oLIVE CLIMA is funded by 50% by the financial instrument Life + of the European Union and has a total budget of 3.649.373 € (EU contribution 1.822.436 €). It was launched in October 2012 and will be completed in September 2017. The main aim of the project is to trial the introduction of new cultivation practices for tree crops in order to find a cost-effective means of mitigating and adapting to climate change. The project focuses specifically on olive-producing areas in Greece, investigating the potential of these areas to increase carbon sequestration by soils, and to reduce greenhouse gases emissions. In other words, in this project, a mitigation approach (enhanced CO<sub>2</sub> uptake and reduced CO<sub>2</sub> emissions) and an adaptation measure (increased soil quality) are tackled at the same time.

► Read more: <http://www.oliveclima.eu/en/>



## GOOD AGRICULTURAL PRACTICES IN OLIVE ORCHARDS



Three farmers groups employ 120 farms in the major olive cultivation areas of Greece to demonstrate the benefits of recycling organic by-products of olive mills through compost or direct application (Fig. 1), enrich soil fertility and biodiversity through sowing mixtures of legume species (Fig. 2), exploit pruning residues as a soil amendment (Fig. 3), and form the trees in a way to maximize carbon storage and productivity. Finally, soil is protected through minimum or no tillage.

Farmers are supported by a group of experts who regularly visit their olive orchards to provide customized advice (Fig. 4). Cultivation practices are optimized according to local soil and climatic conditions through frequent measurements and interaction between farmers and scientists.

The efficiency of project practices is monitored and improved based on sampling and analysis of a wide variety of samples (soil, tree shoots and leaves, weeds, compost, olive mill byproducts, water) and measurements e.g. CO<sub>2</sub> emitted from the soil, soil



4a

water content, tree architectural properties (tree dimensions, Leaf area index).

Mid-term project results of soil  $\text{NO}_3^-$  nitrogen and soil organic matter show that encouraging nitrogen and carbon recovery can be realized by the recommended practices. It is suggested that the use of biomass available either on site (pruning residue) or in near olive mills (composted by-products) would contribute to significant economic and environmental benefits. Irrigation directly affected soil organic matter,  $\text{NH}_4^+$  nitrogen and EC while it favored  $\text{NO}_3^-$  nitrogen increase by carbon inputs.

Suggested project agricultural practices also had positive effects on some biological soil quality indicators. Legumes cover cropping increased soil actinomycetes, bacteria contributing to nitrogen fixation as well as to decomposition of chitin and cellulose. Suggested project agricultural practices also increased soil azotobacter bacteria contributing to nitrogen fixation. Project olive crop management practices also stimulated mycorrhizal colonization in roots of weeds.

The simulations for the soil carbon changes in the next decades, as affected by management and water supply highlight the beneficial effect of the introduction of sustainable practices. In addition, simulations



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show that, in some fields, the quantities of organic material recycled should be increased to achieve increase in soil organic carbon. Detailed reports on project results are available in the dedicated section of the project website:

<http://www.oliveclima.eu/drasis-paradotea-p/>



## DEMONSTRATION PRACTICAL VIDEOS FOR FARMERS

Four videos were produced by the project partners to demonstrate good agricultural practices in olive orchards for climate change mitigation and adaptation:

### WEED MANAGEMENT IN OLIVE ORCHARDS.

▶ Watch video:  
<https://www.youtube.com/watch?v=qbwzB3eq7eM>

### PRUNING OLIVE TREES.

▶ Watch video:  
<https://www.youtube.com/watch?v=9J1w7f0Tghk>

▶ Watch video:  
<https://www.youtube.com/watch?v=w2tgqHE4ygY>

### FERTILIZATION AND ORGANIC MATTER MANAGEMENT IN OLIVE ORCHARDS.

▶ Watch video:  
<https://www.youtube.com/watch?v=CkE01NVjkWk>

### RECYCLING OLIVE TREE PRUNING RESIDUE AND COMPOSTED BY PRODUCTS.

▶ Watch video: soon available on project website

## INTERNATIONAL CONFERENCE "CLIMATE CHANGING AGRICULTURE"

In the last project year, LIFE Oliveclima will organize an international conference on climate change. This 3 day event will be realized in Chania Greece 30/8-1/9/2017. The scientific sessions are: 1. Crop management for climate change mitigation and adaptation, 2. Natural resources conservation, 3. GIS and remote sensing, 4. Environmental certification.

Keynote speakers of international reputation are confirmed (Prof Cristos Xyloyannis, University of

Basilicata, Italy; Prof Luuk Fleskens, Soil Physics and Land Management Group of Wageningen University, NL and School of Earth and Environment at the University of Leeds, UK; Prof Mauro Centritto, National Research Council, Italy).

This is an excellent opportunity to present your work, network with relevant groups and catch up with the most recent state of the art on climate change research, policy and market topics.

▶ Read more: <http://www.climate2017.eu>

## LIFE 1 ENV/GR/942 OLIVE-CLIMA MEETING WITH THE GREEK ALTERNATE MINISTER OF RURAL DEVELOPMENT AND FOOD MR. MARKOS MPOLARIS

A meeting was held on April, 12 between LIFE oLIVE-CLIMA and the Alternate Minister of Rural Development and Food Mr. Markos Mpolaris at the premises of the Ministry in Athens (Fig. 5).

The meeting was requested by oLIVE CLIMA Coordinator ANATOLIKI s.a. Development Agency of Eastern Thessaloniki's Local Authorities due to the interest that is shown by the Ministry of Rural Development and Food for the implementation of environmental friendly measures in agriculture in the context of the Programme for Rural Development for Greece 2014-2020.

During the meeting, the practices of oLIVE CLIMA were presented to Mr. Mpolaris, in order for possible synergies to be investigated with policy



initiatives and financial instruments of the Ministry. In addition, improvements in the legislative framework for applying environmental friendly practices in the fields were discussed.

▶ Read more: <http://ec.europa.eu/environment/life/news/newsarchive2016/april/index.htm#olive>



## LIFE1 ENV/GR/942 OLIVE-CLIMA PRESENTATION IN A WORKSHOP OF EFSA AND E.C.

A workshop "Xylella fastidiosa: knowledge gaps and research priorities for the EU" was held from 12-13 November 2015 in Brussels. This workshop, organized by European Food Safety Authority (EFSA) in collaboration with the European Commission's Directorates-General for Research and Innovation, Agriculture and Rural Development, and Health and Food Safety, aimed to provide a scientific environment to discuss and analyse knowledge gaps and priorities for EU research on *X. fastidiosa*. The workshop was structured through plenary sessions and four discussion break-out groups dealing with knowledge gaps and research priorities on: Surveillance and detection; Vectors identity, biology, epidemiology and control; Plants: host range, breeding, resistance and certification; Pathogen biology, genetics, typing and control. This workshop also aimed to contribute to more interaction with research groups abroad that already have experience in relevant topics, more collaboration among European research

groups, and increased awareness of scientific work previously done by others.

Over 115 experts from Europe, America, Asia and Africa participated with technical presentations and active discussions (Fig. 6). LIFE oLIVE-CLIMA was presented by Dr. G. Koubouris and Prof. C. Xiloyannis through oral presentation, leaflets and discussions. Long-term experimental as well as pilot scale applications are ongoing to compare different orchard management practices and study the effects on olive trees, soil, water, weeds and microorganisms. In brief, tree pruning is modified, a mixture of legume and cereals is planted between the tree rows, compost produced from olive-mill by-products is used as soil amendment and pruning residues are recycled. Based on research experience of decades guidelines for sustainable orchard management to enhance plant health and minimise the risk of disease spread were suggested.





## INTERACTION WITH STAKEHOLDERS FOR THE APPLICATION OF OLIVE MILL WASTE



7α



7β

A meeting was held on April, 8th between LIFE oLIVE-CLIMA and stakeholders from the Decentralized Administration of Crete and Water Management Authorities in Iraklio, Crete (Fig. 7). Long term experimental as well as pilot scale work of ELGO DEMETER Research Centers in previous projects as well as in LIFE oLIVE-CLIMA for the application of olive mill waste in the fields was presented by Dr. G. Psarras and a very interesting discussion was realized on the perspec-

tives of this practice as well as optimization scenarios. Project partners also participate in a national committee on olive mill waste management legislation update. Long term experimental as well as pilot scale work of ELGO DEMETER Research Centers in previous projects as well as in LIFE oLIVE-CLIMA are presented by Dr. V. Kavvadias to contribute to the development of an improved legislative framework for this hot environmental issue.

## PROGRESS WITH PEFCR FOR OLIVE OIL

One of the last steps for the PEFCR for olive oil was the submission to DG Environment of at least one “supporting study” from each country. Supporting studies results are going to play significant role in shaping the draft PEFCR that will be subject to consultation, shortly.

On behalf of Greece, RodaxAgro submitted a study fully based on oLIVECLIMA of NILEAS. The core

study was for organic olive oil of Mr. Kokkinos, while the supplementary study was on a broader group of farmers and olive groves, the major part of the latter being oLIVECLIMA olive groves. The differences of crop husbandry practices were stressed. Emphasis also was placed on traceability and data verifiability. Comments of DG Environment are still awaited.

## DISSEMINATION AND NETWORKING

- DiCEM’s personnel (Prof. C. Xiloyannis) participated on 01.04.2015 in a TV programme broadcasted by the RAI3 National TV Channel talking on the bacterium *Xylella fastidiosa* thought to be the causal agent of brunch dieback symptoms in olive trees.
- Two poster papers were presented by IOTSP in the IOBC/wprs WG “Integrated Protection of Olive Crops” in Kalamata, Greece, May 11-14, 2015.
- DiCEM’s personnel participated in a meeting on innovations in sustainable practices “Innovazioni per un’agricoltura sostenibile” presenting also the oLIVE-CLIMA project actions on 22.05.2015.
- Annual meeting and control of the Project took place at Chora Messinias at the premises of Farmers’ Organization NILEAS, on 4<sup>th</sup> and 5<sup>th</sup> of June 2015.
- In August 2015, G. Michalopoulos (RodaxAgro)



participated in the 1<sup>st</sup> Soil Quality in Life Cycle Assessment Workshop, Bordeaux, France and presented the Project in a poster entitled "LIFE project: oLIVE-CLIMA. Introduction of new oLIVE crop management practices focused on CLIMAt change mitigation and adaptation".

- SSIA presented the oLIVE-CLIMA project in a kiosk which was established during the pistachio festival in the island of Aigina (24<sup>th</sup>-27<sup>th</sup> September 2015).
- Professor C. Xiloyiannis of DICEM presented the project in a paper entitled "CO<sub>2</sub> storage in the soil" in the International Seminar "Carbon footprint of olive growing" organized by International Olive Council (IOC) in Madrid (26-27.10.2015) (Fig. 8). IOC has recently published an application for the calculation of CO<sub>2</sub> balance in olive farming.
- Prof. C. Xiloyannis (DICEM) participated on 17.01.2016 in a TV programme PRESA DIRETTA broadcasted by the RAI3 National TV Channel talking on the bacterium *Xylella fastidiosa* to be the causal agent of brunch dieback symptoms in olive trees. Prof. Xiloyannis illustrated the sustainable orchard management practices adopted at a field experiment located in Ferrandina municipality aiming to improve soil carbon content, avoid soil tillage and improve soil biota evoking some of oLIVE-CLIMA practices.
- Leaflets of oLIVE-CLIMA project were available for the participants of the 26<sup>th</sup> AGROTICA 2016 (28-31.01.2016), at the booth of ELGO - DEMETER (Fig. 9).
- In February 26<sup>th</sup> 2016, G. Michalopoulos (RodaxAgro) and Pr. G. Montanaro (Basilicata University) participated in the meeting of the Technical Secretariat (TS) of the Product Environmental Footprint Category Rules (PEFCR) for olive oil that took place in JRC in Ispra, Italy presenting the oLIVE-CLIMA case for storage of carbon in soil.
- In March 2016, Dr G. Koubouris provided specific training for the demonstration of the Project interventions at Merambello, Peza and Nileas Farmer's' Organization.
- Mr Michalopoulos (RodaxAgro) and officials of the Managing Authority of Rural Development Programme 2014 -2020 for Greece had a meeting on March 28<sup>th</sup> 2016, in order for them to explore possible synergies between oLIVE-CLIMA



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and Rural Development Programme.

- On 11.04.2016 an interview in one of the most popular radio stations of Crete (Radio Crete) was realized where the experience of oLIVE-CLIMA in Olive Mill Wastewater (OMW) application in olive orchards was presented by IOTSP.
- On 20.04.2016 the National Geotechnical Chamber of Greece/Department of Crete uploaded in its website a powerpoint presentation where the experience of oLIVE-CLIMA in OMW application in olive orchards is presented (<http://geoteepk.gr>).
- On 20.04.2016 an interview in one of the most popular food magazines in Sweden (Gourmet [www.gourmet.se](http://www.gourmet.se)) was realized to present the impact of climate change on olive production. oLIVE-CLIMA was presented in detail and leaflets were distributed.
- On 15-17.04.2016 presentation of the project in the National Festival for olives and olive oil in Kalamata.
- LIFE11 ENV/GR/942 oLIVE-CLIMA yearly control meeting was held in Athens on 6<sup>th</sup> of June, 2016.

- In June 2016, a poster was presented by IOTSP in the 2<sup>nd</sup> EWaS International Conference: “Efficient & Sustainable Water Systems Management toward Worth Living Development” held in Chania, Crete, Greece, from 1<sup>st</sup> to 4<sup>th</sup> of June 2016. Also Dr. G. Koubouris was chairperson in the session “Raw and waste water treatment- waste man-

agement” where oLIVE-CLIMA project was also discussed.

- During 2016 a strong networking and collaboration framework was established between oLIVE-CLIMA and projects LIFE CLIMATREE, LIFE ADAPT2CLIMA and LIFE AgroClimaWater.

## PROJECT PARTNERS

Beneficiary	Website	Logo
DEVELOPMENT AGENCY OF EASTERN THESSALONIKI'S LOCAL AUTHORITIES, ANATOLIKI S.A.	<a href="http://www.anatoliki.gr">www.anatoliki.gr</a>	
INSTITUTE FOR OLIVE TREE AND SUBTROPICAL PLANTS OF CHANIA (NAGREF)	<a href="http://www.nagref-cha.gr">www.nagref-cha.gr</a>	
SOIL SCIENCE INSTITUTE OF ATHENS (SSIA)	<a href="http://www.nagref.gr">www.nagref.gr</a>	
LAND RECLAMATION INSTITUTE OF THESSALONIKI (LRI)	<a href="http://www.lri.gr">www.lri.gr</a>	
University of Basilicata, Italy - Department of European and Mediterranean Culture (DICEM)	<a href="http://www2.unibas.it/dicem/index.php/it">www2.unibas.it/dicem/index.php/it</a>	
Rodax Agro Ltd (RODAX)	<a href="http://www.rodaxagro.gr">www.rodaxagro.gr</a>	
AGROTYPOS A.E.	<a href="http://www.agrotypos.gr">www.agrotypos.gr</a>	
1. O.P. NILEAS	<a href="http://www.nileasoliveoil.gr">www.nileasoliveoil.gr</a>	
2. E.A.S. PEZA	<a href="http://www.pezaunion.gr">www.pezaunion.gr</a>	
3. E.A.S. MIRABELLO	<a href="http://www.easm.gr">www.easm.gr</a>	

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