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Final Report

Covering the project activities from 01/09/2015 to 31/08/2019

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LIFE PROJECT NAME or Acronym

Revamping organic farming and its products in the context of climate change mitigation strategies ORGANIKO LIFE+

Data Project

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(%) of eligible costs:	58.21 %

Data Beneficiary

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2. List of key-words and abbreviations

AIAB: Italian Organic Farming Association (Associazione per l'Agricoltura Biologica)
ARI: Agricultural Research Institute
COFA: Cyprus Organic Farmers Association
CUT: Cyprus University of Technology
DE: Department of Environment
EASME: Executive Agency for Small and Medium-sized Enterprises
EC: European Commission
EMT: External Monitoring Team
EPRW: European Pesticide Residue Workshop
FAO: Food and Agriculture Organization of the United Nations
GHG: Greenhouse Gases
GPPs: Green Public Procurements
ICBM: Introductory Carbon Balance Model
ISEE: International Society for Environmental Epidemiology
KC: Kyoto Club
OF: Organic Farming

3. Executive Summary

Four years ago when ORGANIKO LIFE+ project began, Cyprus ranked at the bottom of the EU countries list of organically farmed area (<5%), presenting also with the highest EU percentage of childhood obesity prevalence (20%). Now, the ORGANIKO LIFE+ project is an important science-based outlet that provides unbiased knowledge and facts to the Cypriot society and beyond, about organic agriculture, market and its products. During these 4 years, a multi-faceted action plan was set in place to demonstrate the generation of high quality field data on greenhouse gas emissions related to organic farming (OF) and children's health indicators, while interacting with policy makers and communicating the science to the public and private sector.

The policy uptake of the project findings is already materializing at various societal fronts. The Cyprus government has accepted to adopt the national strategic consultation plan of ORGANIKO LIFE+ team that was submitted for the upgrade of the organic agriculture sector and the improvement of existing healthy eating policies of primary schools in Cyprus. This was also demonstrated in the latest 5-minute video of the project found on its website, where ministerial senior officers from 3 Ministries in Cyprus declared their Ministry's intention to utilize the findings of the ORGANIKO LIFE+ project. The ORGANIKO LIFE+ strategic plan will feed into a revamped governmental plan that will upgrade the existing national agricultural plan of Cyprus (2021-2027). Indeed, the Government in Cyprus through its national adaptation plan to climate change proposed three major mitigation measures that explicitly mention the term organic farming and organic products and these were:

1. Continuation and improvement of agro-environmental measures including organic farming being the number one proposed measure to combat climate change for agricultural soils.
2. Reduction in the use of chemical fertilizers and pesticides as a means to improve biodiversity through the use of organic farming.
3. Provide incentives to farmers to increase use of organic fertilizers and organic farming and apply farming practices of low input agriculture and organic agriculture.

These 3 proposed agro-environmental measures have been approved and are part of the 2021-2027 Rural Development Plan of the government utilizing the ORGANIKO LIFE+ results.

In effect, the project consortium demonstrated the comparative effectiveness of organic agriculture in mitigating greenhouse gas emissions (e.g., N2O) from agricultural fields, responsible in part for the ongoing climate crisis. Using 3-year long field data from organic and conventional field plots in Cyprus, the team showed reduced greenhouse gas emission

rates, and the Minister of Agriculture advised his governmental officers to take up the ORGANIKO emission factors results and act on them. The Department of Environment, following the Minister's advice and taking into account the results, adopted the new emissions factors and will soon apply to the competent European authority for revising Cyprus emission factors for N2O. The team also demonstrated the effectiveness of an organic dietary intervention in lowering the body burden of pesticides and consequently lowering biomarkers of oxidative stress/inflammation in primary school children. This was the largest globally organic diet and health clinical trial. The children's health trial with an organic dietary scheme generated high quality health data to support measures and initiatives that promote healthy eating at schools. The Ministry of Education and Culture has agreed to take up the children's health trial results and exploit them in relevant policy measures for school cantines and for considering the set up of primary school meal plans, in a large scale. It is anticipated that the specific actions will be further discussed with the officers of the Ministry of Health and the Ministry of Education, Culture and Sports in relevant meetings with the project team.

Due to ORGANIKO LIFE+ efforts promoting organic food and lifestyle, a momentum has evolved these past 4 years in Cyprus, where specific policy interventions are implemented via the green public procurement (GPP) policy measures with the aim to increase the organic food market share and at the same time to tackle childhood obesity. About 50,000 individuals during the 4-yrs period got to know and interact with the ORGANIKO activities via numerous science communication and citizen awareness activities. Through the EU Parliament event that we organized on 23 May 2018, our project findings were communicated with prominent MEPs, including the Cypriot MEPs Mr. Mavrides, Mr. Sylikiotis, Mr. Papadakis, Mr. Hadjigeorgiou and Mr. Eickhout (NL). Another major accomplishment was the organization of the project's final conference, CLIMATICO 2019; about 150 participants from various countries attended it where the latest updates on climate mitigation research and how this relates with the latest developments and trends in relevant fields of agriculture, public health and environment.

The ORGANIKO LIFE+ project findings have been communicated and transferred to other EU countries, such as Italy. Italy, being a historic and globally active organic agriculture and market key player, was particularly focused to communicate our project results. Prominent Italian organizations, such as organic NGOs (i.e., FEDERBIO, AIAB), the Italian Ministry of Agriculture and international organizations whose headquarters are in Italy, such as EFSA and FAO were contacted and face to face meetings were held with all of them.

The implications of policy uptake and the future of OF and organic dietary schemes at the school level in Cypriot society are huge and received our full attention. The project ended, but the momentum is strong and we don't stop here; we continue our efforts to mobilise local and governmental authorities regarding the possibilities of expanding the ongoing investment of the government and of the private sector on organic farming and its commercial products. A major step forward will be the implementation of organic meals (first focused on fruits and vegetables) in primary schools by the government, showing clear cost-benefit analysis results as proposed by the Ministerial Council. A feasibility project (PRISHEC) on this proposed intervention measure for primary schools has been funded to our team by the Cyprus Research Promotion Foundation to test the feasibility of an organic vegetables and fruits meal intervention scheme in 3 schools starting January 2020. Following the end the project, a number of after LIFE+ activities are taking place with the aim of promoting organic farming and its products through important channels, such as those of the Ministry of Agriculture, Rural Development and Environment, the Ministry of Education and Culture, the Commissioner of the Environment and the public universities in Cyprus and the COFA.

Using the above evidence-based demonstration facts as a basis of dialogue and planning, the government, the school boards and the private sector of OF and its products can work together towards a sustainable society with the possible implementation of carbon farming credits, sustainable diets and healthy school meals. These are important farm to fork measures that will effectively tackle the climate crisis and the childhood obesity that hit hard all Southern Mediterranean countries, including Cyprus.

4. Introduction

More than any other European geographical cluster, the agricultural sector in Southern Europe has been adversely affected by a number of serious climate change impacts (reduced annual rainfall, increased temperatures, unexpected floods and prolonged heat waves) resulting in a reduction of the crop productivity, degradation of soil and biodiversity as well as in an increased risk of food safety and biodiversity of natural resources.

The ORGANIKO LIFE+ project placed particular emphasis on actions that mitigate the impacts of climate change on agriculture, the environment and humans. The environment, and in particular agriculture, contributes only partly to the greenhouse gas emissions (10%,

Eurostat, 2019), but the global warming potential from nitrous oxide and methane (greenhouse gases) is 265 and 28 times greater than that of an equivalent mass of carbon dioxide, respectively (IPCC, 2019).

Organic farming in Cyprus in recent years has been showing an increasing trend in arable land; however, the total organic area under cultivation was below the average of the 28 Member States of the Union, standing at 4.6% of the total cultivated area (Eurostat, 2017).

It is widely acceptable that organic farming promotes environmental sustainability but there is no clear evidence of climate change improvement (e.g. greenhouse gas emissions). Also, in the beginning of the project in 2015, there was no clear scientific evidence that eating organic foods is associated with better health. Several studies were published on the nutritional value of organic foods, but o potential positive effects on human health using randomised clinical trials were scarce.

In addition, for more than two decades, obesity rates in Cyprus have been very high (among the highest in Europe) in both adults (25.5%, WHO, 2013) and children (21% boys & 19% girls between the age of 6 and 9, COSI, 2018), showing no improvement.

In this project, we implemented field experiments to demonstrate that improved organic farming practices increase the ability of the agro-ecosystem to ameliorate its environmental competitiveness in a semi-arid region like Cyprus, where climate change consequences are expected to be severe in the next decades. We envisioned that the quality indicators of organic farming used in this project would highlight the environmental benefits associated with adaptation to climate change; such indicators include: the increase in biodiversity and soil fertility, reduction in greenhouse emissions, lack of use of synthetic chemicals, like pesticides and fertilizers, and enhanced carbon sequestration. Therefore, the increase of organic farming in Cyprus was expected to considerably reduce greenhouse emissions and thus, would contribute to efforts towards adapting to climate change. The environmental quality indicators used in our demonstration activities and related actions were anticipated to highlight the benefits of organic farming towards contributing to adaptation of climate change. Moreover, quality indicators in organic versus conventional products were applied to several fruits and vegetables. The ORGANIKO project implemented and tested the effectiveness of field-tested protocols and processes demonstrating the comparative advantages of OF over those of conventional agriculture in mitigating greenhouse gas cycles relating to nitrous oxide emissions being part of EU reduction protocol commitments. Improved land management practices and low carbon farming OF practices that were implemented offer farmers with a strong incentive in increasing % OF cultivated land, particularly in climate-impacted

countries, such as those in the Mediterranean basin. A strategic national plan of mitigating climate change in agriculture through the advancement of organic farming and their products in the Cypriot economy was formulated as the synthesis report of all activities of this demonstration project.

The ORGANIKO Actions were fully aligned with the EU 2014 policy priorities in the area of climate change mitigation for the following reasons: i) focus on synergies between environmental and climate actions associated with agriculture through the implementation of OF practices to mitigate climate change and increases soil biodiversity and carbon storage in soils; ii) apply low emission OF practices with a transformational impact, because the OF products will enter the market in a systematic approach; and iii) include carbon foot-printing or measurements that demonstrate mitigation improvements through the application of OF practices. The ORGANIKO project embraced its findings under the umbrella of the relevant EU Directives (EC 834/2007, 889/2008), highlighting the impact of LIFE+ projects towards the implementation of environmental EU policies. The ORGANIKO project findings were used by our beneficiary KC to promote OF and its products in Italy including related climate change mitigation measures for agriculture in Italy.

The site-specific organic farming protocols coupled with the technical seminars conducted throughout Cyprus could facilitate the transfer and adoption of them by other prospective or current organic farmers. The health study showing the decrease in pesticides concentrations in children's urine fed with organic diet (C3 Action) could be replicated in another country, such as Italy (facilitated by KC). At the same time, the communication and exploitation schemes of ORGANIKO (Action E1) to promote organic products allowed for improved marketing effectiveness to consumers; this effort coupled with the questionnaire-based consumer perceptions and solutions can amplify the consumer demand. Our networking efforts with related EU projects allowed for the replication and transferability of project's protocols and toolboxes to other Mediterranean countries with similar meteorological conditions and water-scarcity profiles (Action E1).

5. Administrative part (maximum 1 page)

In order to ensure good organisation of the project, a project administrative document including allocation of tasks and deliverables for each Action and for each beneficiary was developed by CUT right after the kick-off meeting. An indicative timeline with the events and reports for the four years of the project was also included. Following the 4th consortium meeting, a timeline with the actual events and reports by mid-2018 and another indicative

timeline until the end of the project were developed. These were sent to the associated beneficiaries for approval and comments. Moreover, the guidance document, that was prepared one month after the project initiation, included a description of tools used for project monitoring, such as, internal progress reports every month, consortium meetings every 6 months, meeting evaluation questionnaires after every meeting, financial and administration reports every 3 months and a frequently-updated deliverables control tool.

No changes have been made in the initial project's management structure. The only change was the modification of the C3 Action study design for which an amendment request was sent on July 2016 and subsequently was approved by EASME (30/09/16). The communication with EASME and the External Monitor was achieved mainly through emails and through face to face meetings (1 meeting with Mr. Michel Quicheron and 4 meetings with Mr. Elias Demian).

6. Technical part

6.1. Technical progress, per Action

Action A1: Evaluation of the current situation and assessment needs of the organic farming sector in Cyprus (CUT, ARI, KC)

Foreseen start date: 08/15	Actual start date: 09/15
Foreseen end date: 04/16	Actual end date: 06/17

The aim of this Action was to evaluate the current situation in Cyprus regarding the organic market, its stakeholders, and the consumer perceptions on organic products. As such, the Action consisted of literature reviews on organic farming with regards to health and environmental aspects, stakeholders mapping reports in Cyprus and Europe and a consumer survey on the consumers' behaviours and attitudes towards organic food products.

The results of this Action fed into the activities of the rest Actions and helped towards their more efficient implementation. Specifically, the literature review on organic farming with regards to health indicators helped us to better define the needs for the children's health trial (Action C3) so the study was designed according to the findings of the review. The stakeholder mapping reports provided essential info on the major stakeholders in Cyprus and Europe and hence it was easier to contact them for dissemination and ideas exploration

purposes (Action E1). The literature review on organic farming with regards to environmental aspects provided the basis for the development of protocols for the farmers (Action C1) and the measurement of greenhouse gases in organic and conventional field plots of Cyprus (Action C2). Based on the deliverables of this Action, it became evident that there is room for development of the organic sector in Cyprus and the various stakeholders need to work collaboratively in order to increase consumers' awareness. Furthermore, the organic farming systems can act towards the climate change mitigation if certain conditions are applied and the future intervention trials investigating the effectiveness of organic diet on human health need to be designed properly in order to show clear and high-quality health results. All above-mentioned deliverables were submitted in the midterm report and can also be found in the project's website (http://organikolife.com/en/category/deliverables/).

Activity A1.1: Literature review (CUT, ARI)

Foreseen start date: 08/15	Actual start date: 10/15
Foreseen end date: 02/16	Actual end date: 06/17

The literature review assessed two aspects of organic farming (environmental/emissions quality and health), hence two reports were developed, one by ARI and one by CUT. ARI performed a comprehensive review of scientific peer reviewed papers through which they emphasized and identified areas where fundamental information for organic farming practices that are related to climate change was lacking. Also, through this review, the special research needs for increasing the environmental performance of the organic farming system were underlined, as well as opportunities and weaknesses of the organic farming systems. The review concluded that organic farming is a potential and promising climate change mitigation strategy; however, optimization of the current organic farming practices and knowledge transfer to the farmers are necessary, so that reduced emissions of greenhouse gases and increased crop productivity can be achieved.

CUT conducted a systematic literature review on the effect of organic diet intervention on antioxidant capacity and biomarkers of oxidative stress and inflammation in order to design a sound methodology for the intervention study conducted under Activity C3.1. The review showed that the intervention studies conducted so far haven't got conclusive results regarding the effectiveness of the organic diet on biomarkers of oxidative stress and inflammation and the reasons for this could be the limited duration of the intervention period, the use of specific

food items studied instead of a thorough organic diet and the small sample size. These observations led us to the amendment request for re-designing of the Action C3. The review was completed on time but needed few revisions according to the comments of the EASME letter dated 13/01/17 that were eventually fully incorporated into the project activities and reports. Both reviews were submitted along with the midterm report and can also be found in the project's website.

Activity A1.2: Consumer perceptions survey (CUT)

Foreseen start date: 08/15	Actual start date: 09/15
Foreseen end date: 04/16	Actual end date: 06/17

The consumer perceptions survey aimed to understand the behavioural system of the Cypriot consumer of organic food using the Theory of Planned Behaviour model. The foreseen report was completed with a delay of 15 months. The main reason of the delay was the consumers' low participation rate that required more time spent for subject recruitment. The initial approach to contact the public through telephone was not particularly effective so to overcome this barrier, personal interviews were conducted complementary to the phone interviews. The interviews were conducted using a random, stratified (city as the strata) methodology with proportional allocation based on the number of households in each of the sampled regions of Cyprus (Limassol, Nicosia, Pafos, Larnaca and Famagusta) (Census, 2011). However, this delay did not affect the progress of other Actions as the rest were running in parallel. The target population was adults (18-65 years) and the sample size was 420 people with a statistical power of 83%. For validity control, a comparison of demographic characteristics of the sample with demographic characteristics described in the latest census of 2011 was performed. The questionnaire used was designed using literature review, focus group with Cypriot consumers, multiple discussions with the beneficiaries, two pilot studies and an exploratory factor analysis. The main conclusions of the survey were the below:

1. The model used was appropriate to capture the consumers' attitudes and behavioural intentions towards organic food.
2. There are major differences between men and women such as subjective norms of women influence their behavioural intentions to buy organic food, but this does not apply to men.

3. There are major differences between people who have purchased organic food in the past and people who haven't such as prior purchase of organic food fosters the effect of behavioural control on the behaviour.

The report also suggested the potential for intervention actions in various points of the organic food chain. The results of this survey were used to compare the attitudes and perceptions of the public at the beginning and end of the project. Also, the results were used for organising targeted campaigns for the public to increase their trust to organic products and consecutively to increase the organic market share in Cyprus. A PowerPoint presentation with the main points of the report has been prepared for dissemination to the relevant stakeholders. In combination with other research findings of the project, the survey results were used to construct a strategic plan of promoting the consumption of organic food and influencing consumer behaviour. The consumer survey report was submitted along with the midterm report and can also be found in the project's website.

Activity A1.3: Stakeholder organic sector mapping (ARI, KC)

Foreseen start date: 08/15	Actual start date: 10/15
Foreseen end date: 02/16	Actual end date: 03/16

The objective of the stakeholders' mapping was to map the organic farming sector in Cyprus and Europe. In the Cyprus stakeholders mapping conducted by ARI, the socio-economic characteristics of the sector have been covered by contacting the competent authorities of the Republic of Cyprus. Descriptive statistics as well as data regarding the market share of retailers have been included in the mapping review. Imports and exports of plant protection products and fertilizers that are approved for use in organic farming schemes were not available. In particular, the authorities in Cyprus are not keeping separately imports or exports of plant protection products and fertilizers that are approved for use in organic farming schemes. A non-exhaustive list with all plant protection active substances and or microorganisms that are currently used in Cyprus was also created. In the EU stakeholder report, KC presented the institutional stakeholders of the organic sector in Europe, as well as some selected EU NGO stakeholders' networks. Following the comments of the EASME letter, a networking plan was prepared (and submitted along with the midterm report) in which the achieved synergies and future networking activities based on the identification of

stakeholders were discussed. Both stakeholders' mapping reports were submitted along with the midterm report and can be found in the project's website.

Action C1: Tailoring organic farming protocols to farmer needs (ARI)

Foreseen start date: 08/15	Actual start date: 09/15
Foreseen end date: 10/16	Actual end date: 10/16

The aim of the current Action was to design specific protocols of organic farming (OF) practices in crops of major importance for Cyprus agriculture, i.e., apples and barley. The action was successfully completed, and the deliverables were revised in terms of attractiveness according to the comments of the EASME letter with subject "Second Progress Report and Monitoring Visit" (no date). Moreover, the review reports of plant nutrition fertility, irrigation management and soil fertility schemes were prepared along with the according manuals for each crop and delivered as three reports for consistency purposes, along with the midterm or second progress reports and can be found in the project's website (http://organikolife.com/en/category/deliverables).

Activity C1.1: Design aspects for improved organic farming practices

Foreseen start date: 01/16	Actual start date: 02/16
Foreseen end date: 06/16	Actual end date: 10/16

A comprehensive study of already established protocols implemented in organic farming was completed and the protocols for both apple and barley production in Cyprus were prepared. Questionnaires for farmers were prepared, tested in a pilot scale and finally approved by the ARI team for both crops. The questionnaire included questions on the identification of hot spots for system improvement regarding GHG emission reduction and climate change. Meetings with the farmers were performed in July, August and September 2016. The main findings of this survey are summarized as follows:

1. The nutrient management and the soil fertility of organic farms are not actually tailored with the needs of the crops.
2. Farmers are using very simple rotation schemes with the minimum share of legume crops in the rotation scheme.

3. The primary nutrient input in organic farming is manure. However, some biofertilizers are also implemented (mainly in apple orchards).
4. There is a knowledge gap regarding the importance of soil analysis and fertility among the organic farmers.
5. There is an urgent need for novel varieties specifically adapted under organic farming schemes.
6. Drought and high temperatures are environmental factors which are critical for farmers.
7. Weeding in farms that are under convention is critical.
8. There is an overall lack of knowledge in terms of theory and general principles of organic farming. However, there are farmers with high expertise.

According to these findings we proposed specific policy measures to increase the awareness of organic farmers in critical issues that are related to nutrient management.. During the project's duration we organized specific workshops for Nutrient Management Schemes in Apples and Barley (the presentations for interested farmers are available in the project's website) in collaboration with COFA. Also, protocols for organic farming for each crop have been prepared and revised according to the comments from EASME (April 2019). Moreover, in the pilot farms for barley, we designed new rotation schemes by increasing the share of legumes and in combination with soil amendments like compost and manure to improve the soil fertility of the system. In apple orchards pilot farms, we included compost teas as an alternative method to improve the nutrient use efficiency of the crop as well as mulching to reduce weed competition especially during spring. All the above practices are now available for the farmers through the ORGANIKO website.

Activity C1.2: Plant nutrition fertility scheme

Foreseen start date: 01/16	Actual start date: 01/16
Foreseen end date: 06/16	Actual end date: 06/16

Tuning of nutrient inputs was the main objective of this activity. Nitrogen has been identified as the most important nutrient, since it stimulates vegetative growth and increases yield and protein content, especially for barley. However, the excess use of nitrogen could cause ground water pollution, or it could increase N_2O emissions. The review report of plant nutrition fertility scheme as well as the plant nutrition manual for each crop was prepared and delivered

as one report for consistency purposes. The final deliverable has been revised according to the comments from EASME letter (dated 20/11/17) and was submitted along with the second progress report.

Activity C1.3: Irrigation Management Scheme

Foreseen start date: 01/16	Actual start date: 01/16
Foreseen end date: 06/16	Actual end date: 06/16

Improved irrigation systems are already in place. The irrigation schemes (time and amount of water) have been developed empirically and are available for the Cypriot farmers. A specific toolbox has been launched in the website of ARI and is available for the farmers to implement it. According to the statistics of the ARI website, the number of visitors who used this specific application were 2608 since 2016 while 4880 visits have been recorded. The current tool is extremely important not only for the farmers but also for the extension specialists who are supporting organic farming. The use of this tool has been promoted from ARI researchers to the Department of Agriculture, while it has been communicated to the farmers during the overall training activities of ARI, beyond the scope of the ORGANIKO project. Specific net irrigation demands for apples were developed according to the evapotranspiration model and the procedure proposed by FAO. The review report on irrigation management scheme as well as the plant irrigation scheme for each crop was prepared and delivered as one report for consistency purposes along with the second progress report.

Activity C1.4: Soil fertility improvement scheme

Foreseen start date: 01/16	Actual start date: 07/16
Foreseen end date: 06/16	Actual end date: 10/16

The activity started on July 2016 and the nitrogen mineralization potential of four different types of manures during time was examined in order to evaluate the impact of different types of organic amendments on soil fertility in arid regions. In addition, a model was developed that will help in the evaluation of nitrogen mineralization under Cyprus conditions. The review report of soil fertility scheme as well as the soil fertility manual for each crop was prepared and delivered as one report for consistency purposes.

Soil samples were collected according to SOPs of the Agricultural Microbiology Lab and analysed for a series of parameters that are related to nutrient management and soil fertility. Low coefficients of variation (CV) were calculated for pH and EC in both systems while, high CV (>45%) were calculated for NO_3. The different parameters are strongly varied both between an1d within fields and it is in accordance with previous studies (Lopez-Granados et al., 2002). Our findings indicate that in barley fields the management system doesn't affect the chemical and physical characteristics of the soil meaning that the practices that are implemented in organic farming fields are not promoting soil fertility. Indeed, in our survey through questionnaires (Activity C1.1) with the farmers, we found that they are not aware about the importance of legume crops in rotation schemes. Besides, our survey implies that within organic farmers there is a different perception regarding the use of organic amendments. The quality of composted farmyard manure used is not confirmed while compost use is limited due to increased cost. Our findings suggest that there is an emerging need to improve soil organic matter not only in conventional managed soils but also in organic soils.

On the contrary, in apple orchard soils organic farming has a significant effect on specific soil fertility indicators. In particular, soil organic carbon, nitrogen-nitrate ions, as well as total nitrogen were higher in organic apple orchards soils. The higher values noticed are related to the different nutrient management system implemented. Farmers in organic farming apple orchards are using manures and they are not using herbicides to control annual weeds. Instead, during spring and early summer, weeds are incorporated into the soil to reduce water competition. This practice increases easily decomposable organic matter creating therefore a substantial pool of easily available nitrogen forms like nitrates and organic carbon. Our findings suggest that mulching, as well as novel practices like compost teas might increase nutrient availability when it is needed from the crop thereby reducing nitrates levels in soils and weed development during spring that is not beneficial for the crop. The review report on soil fertility improvement scheme is relevant here and it was submitted along with the midterm report and can be found in the project's website.

Action C2: Climate mitigation performance assessment based on agronomic and environmental indicators

Foreseen start date: 07/16	Actual start date: 07/16
Foreseen end date: 05/19	Actual end date: 05/19

The objective of this Action was to evaluate the quality performance for a series of climate mitigation indicators, including indicators of agronomic and environmental quality value in both OF and conventional agricultural systems in Cyprus. Laboratory tests showed that using agricultural waste products like those of citrus industry resulted in a substantial reduction of N_2O emissions compared to chemical fertilizers. The microbial diversity after the addition of these amendments was substantially higher. The first results of barley and apple orchard yield showed that the yield in organic farming was lower compared to that of conventional farming. Through LIFE+ORGANIKO we monitored the N2O fluxes for three growing seasons and the overall mean emission factor ranged from 0.11 to 0.24 depending on the crop and the growing season. These findings clearly show that Cyprus inventory calculations currently overestimate the contributions of agricultural ecosystems to the GHG emissions load for Cyprus, leading to higher costs. The total annual savings for the Republic of Cyprus are expected to reach 2.2 million euros. We communicated these findings to DE and in particular to the Climate Change Unit of the respective Ministry and actions are expected to be taken to reduce the emission factors (EF) for barley crop at a minimum before considering inclusion of other crops at 2020. To achieve this, a full report containing 3-yrs of data was delivered to the Ministry of Agriculture by the end of the project.

Activity C2.1: Monitoring of environmental metrics related with climate mitigation and agroecosystem services

Foreseen start date: 07/16	Actual start date: 07/16
Foreseen end date: 05/19	Actual end date: 07/19

The farms selected during Activity 1.4 were monitored during the project's period, as foreseen in the proposal. Annual C inputs to soil were calculated based on estimates from above-ground plant production and root biomass measurements. In the farms, monitored in organic project for 3 years, as well as in the pilot farm of ARI at Acheleia Paphos, soil organic C was determined. In ARI pilot farms, we found that farming system significantly affected soil carbon stocks however nutrient management scheme determined the amount of carbon sequestration rate. The lowest SOC values were detected in conventional rotations receiving fertilization while the highest values were found in organic farming plots. In conventional system, rotation A and B caused a slight but not significant increase of carbon

stocks in the soil while rotation C exhibited a reduction of carbon pool in soils. In organic farming managed plots, incorporation of farmyard manure and compost in the system resulted in a significant increase of soil organic carbon. The sequestration rate within the manure treated plots ranged between 139.4 to 256.5 kg/ha/year. In compost treated soils the carbon sequestration rate was slightly higher compared to manure, but this was not significantly different. Plots that received composted material had a sequestration rate ranging from 273.3 to 348.2 kg/ha/year. Carbon sequestration was not different between conventional and organic managed plots without any organic input. These findings highlighted the importance of organic amendments on carbon sequestration since the organic carbon was higher in organic plots received organic amendments. The low values noticed in organic plots that received no input was attributed to the lower biomass production of the cultivated crops and the absence of external input.

Regarding long-term carbon sequestration, the model ICBM was calibrated using the conditions of Cyprus. This model was originally conceptualized with one rapid and one slow soil carbon pool. The model was developed and based on long-term trials in Uppsala, Sweden. Recently, a climate- and soil-based activity index was presented for ICBM, which in theory provides for model portability by estimating a site-specific soil activity index relative to the Uppsala site. Our findings suggested that that the decomposition rate of organic carbon in Acheleia area was 2.09 times higher compared to that of Central Sweden where the model was calibrated. The average annual carbon inputs to soil from barley residues was 0.748 tn/ha, from vetch 2.01 tn/ha and 2.3 tn/ha from chickpea. The carbon input derived from manure and compost incorporation was 1.22 tn/ha and 2.60 tn/ha respectively. The inert amount of carbon in organic managed fields was half of that measured in plots without any organic input and that was similar with that of not treated experimental plots located in conventional managed fields. In particular, the amount of inert C was 23.16 tn/ha. Overall, the predicted final SOC stocks with ICBM model shows that organic farming practices which are including external inputs is expected to exhibit an increase of 2.1 to 2.9 tn/ha in a time span of 30 years. Our analysis also revealed no difference between conventional and organic systems when no external organic input was included in the system. When the addition of external inputs was not annual but occurred every 3 years then the C sequestration was much less and equal to 0.9 tn/ha. We also checked barley monoculture under conventional farming systems, and we estimated a substantial loss of SOC stocks after 30 years. Our findings suggested that specific and well-designed rotations including external organic inputs might be a good strategy for

carbon sequestration. Under the same context we calibrated ICBM for apple trees in order to reveal the sequestration potential of improved practices regarding nutrient management.

Soil samples during the National Survey were collected according to SOPs of the Agricultural Microbiology Lab and analysed for a series of parameters that are related to nutrient management and soil fertility. Our findings indicate that in barley fields the management system doesn't affect the chemical and physical characteristics of the soil meaning that the practices that are implemented in organic farming fields are not promoting soil fertility. Surprisingly, we found that agricultural system did not affect the composition of the microbial community of Cyprus soils. Significant differences were noticed between crops. For example, the composition of bacterial community of apple orchards was significantly different than that of barley further stressing the importance of plant component on soil microbial community. In addition, in our survey through questionnaires (Activity C1.1) with the farmers, we found that they were not aware about the importance of legume crops in rotation schemes. Besides, our survey implied that within organic farmers there was a varying perception regarding the use of organic amendments. The quality of composted farmyard manure used was not confirmed while compost use was limited due to increased cost. Our findings suggested that there is an emerging need to improve soil organic matter not only in conventional managed soils but also in organic soils.

On the contrary, organic farming had a significant positive effect on specific soil fertility indicators of apple orchards. In particular, soil organic carbon, nitrogen-nitrate ions, as well as total nitrogen were higher in organic apple orchards soils. The higher values were related to the different nutrient management system implemented. Farmers in organic farming apple orchards are using manures and they are not using herbicides to control annual weeds. Instead, during spring and early summer, weeds are incorporated into the soil to reduce water competition. This practice increases easily decomposable organic matter creating therefore a substantial pool of easily available nitrogen forms like nitrates and organic carbon. Our findings suggest that mulching, as well as novel practices like compost teas might have increased nutrient availability when it is needed from the crop thereby reducing nitrates levels in soils and weed development during spring that is not beneficial for the crop.

Activity C2.2: Mid-, and long-term evaluation of farming protocols in climate mitigation

Foreseen start date: 07/16	Actual start date: 12/15
Foreseen end date: 05/19	Actual end date: 05/19

During LIFE+ORGANIKO, a systematic and comprehensive soil direct N_2O emission system was monitored for the first time in Cyprus for crops grown under rain-fed conditions for 3 consecutive growing seasons. The overarching objective was to assess the impact of organic and conventional farming practices giving emphasis particularly to different nutrient management schemes. Our findings demonstrated that N_2O emissions both in organic and conventional systems follow a seasonal pattern and this was related to crops and environmental conditions. The highest emissions of N_2O were noticed in a short period after the application of NH_4NO_3 and manure and this trend was crop-depended at least for manure. The results produced in ORGANIKO showed for rained crops (barley, vetch and pea) an essential effect of compost amendment on reducing soil N_2O emissions in comparison to conventional mineral N management. Apparently, the release of N from manure was not synchronised with crop uptake making nitrogen available for soil bacterial activity resulting in N_2O emission peaks. In this regard, manure application in organic farming should be optimised at least on timing. The emission factors (EF) calculated for each crop under the different schemes was by far below the default IPCC values for N additions from mineral fertilisers and organic amendments possibly due to low soil water availability (low rainfall). Interestingly the EF calculated for pea was not depended on nutrient management scheme while the lowest EF was estimated in compost treated plots and this was crop depended. Additionally, to evaluate alternative organic amendments, we explored the use of fruit wastes like citrus and bananas and compared them with chemical fertilizers. The incubation study was performed under lab conditions to examine the possible use of these materials in large-scale trials. In particular, we found that incorporation of banana wastes resulted in a substantial increase of N_2O and CO_2 emissions compared to the other organic amendments. The lowest N_2O emission was noticed in control soils while the highest in soils amended with NH_4NO_3. Soil incorporation of orange peels resulted in a substantial increase of molecular microbial biomass 5 and 34 days after the incorporation of the amendments into the soil suggesting a differential response of soil microbial communities on organic amendments. Comparative assessment analysis between different systems was published in the Journal of Environmental Management. Following this long-term evaluation of the protocols in climate mitigation, training material has been prepared for nutrient management and soil indicators. For this work, a presidential award was given to Dr. Michalis Omirou (ARI) from the CY President for his input on environment and sustainability within the framework of the project on 5 June 2019 in Nicosia.

Activity C2.3: Barley agronomic performance and potential benefits of OF

Foreseen start date: 07/16	Actual start date: 12/15
Foreseen end date: 05/19	Anticipated end date: 05/19

The overall yield obtained was substantially lower compared to the average mean of the cultivar (Achna) and this was related to the extremely low precipitation that was noticed during the cultural period. Similar findings were also noticed during the previous growing season. These results stressed the significance of water availability on agriculture in semi-arid region. However, the yield of barley grown under conventional farming system was significantly higher compared to that of organic farming. This was attributed to the use of chemical fertilizers and in particular nitrogen. After harvesting during all growing seasons barley grain and hay samples were harvested and analysed in the Agricultural Chemistry Laboratory for total protein, nitrogen content, ash, minerals (Ca, Mg, Zn, Mn, Cu and Fe). For the hay samples digestibility analysis was also performed. Overall, growing season and nutrient management strategy significantly affected barley grain content in total N, Ca, Mg, Zn, Mn, Cu and Fe.

Activity C2.4: Apple agronomic performance and potential benefits of OF

Foreseen start date: 07/16	Actual start date: 10/16
Foreseen end date: 05/19	Anticipated end date: 05/19

During this activity, a pilot farm was established at Kyperounta area and at Stroumbi area. Four different nutrient management practices were established namely a) mulching, b) manure c) compost and d) compost tea. Each treatment was repeated 3 times in a complete randomized design and fruit yield was recorded. A neighbour conventional field was included in the study to compare the inherent characteristics of the field. Soil analysis showed that organic C in organic field was slightly higher (1.3%) compared to the conventional (0.9%). The nutrient treatment had a significant effect on fruit weight. The highest fruit yield recorded in conventional field treated with chemical fertilizers (161.86 g mean fw/fruit) but was not significantly different with that of manure treated field (154.78 g mean fw/fruit). Significantly lower fruit yield recorded in trees treated with compost tea and mulching. The mean fruit

yield for these treatments was 151.86 and 146.21 g fw per fruit. The lowest fruit yield was found in compost treated trees (137.35 g fw/fruit) indicating that compost was not an appropriate management practice to increase productivity in apple organic orchards. Our findings suggested that combined practices like splitting compost tea applications or compost tea and manure applications could be used to further increase organic apple orchards yields. A similar experiment was implemented in another location, at Stroumbi Paphos and qualitative characteristics like firmness and color saturation were recorded. In detail, in this orchard no significant differences have been observed between the organic farming nutrient schemes treatments and Pink Lady yields ranged from 141.39 g/fruit to 158.3 g/fruit respectively. We found that apples treated with compost tea had significantly higher firmness compared to the other nutrient management treatments. These fruits exhibited the highest amount of total suspended solids as well as red color. The lowest a-fruit color value was observed in compost treated trees (25.4) while mulching and manure treated trees produced fruits with similar a-fruit color values (27.8 and 28.4 respectively). It is evident that nutrient management scheme has a significant effect on apple fruit quality. During the post-harvest period, no differences were noticed among the different nutrient management schemes. Details on the performance of the barley crop are presented in Deliverable C2.4.

Action C3: Demonstrate comparative advantages of selected organic products in decreasing the body burden of organophosphate pesticides in children

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 05/17	Actual end date: 06/18

The technical content of this Action was amended after an approval by EASME (30/09/2016). This was unavoidable, because the initially proposed study in the children's oncology units was not practically feasible as this emerged during our thorough literature review performed during the early stages of the Activity A1.1. The modifications requested were described in the midterm report. We implemented the study in healthy primary school children between January and April 2017 and we are very happy for this much needed change that was to the benefit of the project. Evidence suggested that a systematic organic dietary intervention program followed for up to 40 days by healthy children significantly reduced the magnitude of biomarkers of exposure to pesticides (3-PBA and 6-CN), and over time, for all measured oxidative stress / inflammation (OSI) biomarkers (8-iso-PGF2a, 8-OHdG and

malondialdehyde). More details can be found in the publication of the trial at https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0219420

The strengths of our trial were:

1. Compliance was reported to be 90% or higher, perhaps from a peer pressure effect, as all children at a given school, were assigned to follow the same intervention at the same time; however, we cannot exclude the participants' reporting bias.
2. A single organic foods-certified restaurant was responsible for the preparation and provision of organic meals to all schools during the organic period, eliminating differences in cooking preparation options and cooking quality. As such, the same raw products, preparation of foods, delivery and consumption of organic meals was followed by all participants.
3. The risk of bias in intervention assignment was minimized by the use of central randomization. Thus, the results can be considered generalizable for the specific population (i.e. primary school children residing in an urban area following the Cypriot diet).
4. Given that participating schools were randomly selected from various areas of the city of Limassol, we did not expect that background population characteristics such as neighborhoods' socioeconomic backgrounds have influenced the observed data.
5. The larger sample size in comparison to previous trials on the effect of organic diet on oxidative stress/inflammation biological end points. This is the only study on this topic covering a large intervention duration of up to 40 days.

Activity C3.1: Study Design at Schools using Organic Products (CUT)

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 05/17	Actual end date: 06/18

The urinary samples analysis for pesticides metabolites and biomarkers of inflammation and oxidative stress was successfully completed. Moreover, the statistical analysis of the data was completed. The pesticides statistical report and the children's biomonitoring report were submitted. The findings are summarized below:

a. Six schools agreed to participate; three schools were randomly allocated to Group 1 (67 children) and the other three to Group 2 (124 children). There were 24 children in Group 1 and 18 children in Group 2 who withdrew from the study 1–11 days after the beginning of

the organic period and did not provide an organic period urine sample, who were excluded from the data analysis.

b. A total of 149 children were included in the main analysis with 43 children in Group 1 and 106 children in Group 2.
c. The sex distribution of the children was balanced (51% males). The mean age was 11 years old and the majority of children (89%) completed 29–40 days of organic diet.
d. At baseline, most children had a normal weight (61%) with 38% being overweight or obese. The percentage of overweight and obese children exceeds the percentage found by Savva et al., 2014 (20.1% overweight, 8.1% obese).
e. The mean energy intake of the participants during the conventional period (2229 kcal) was estimated to be higher than the reference dietary guidance value [average=1976 kcal (2043 kcal for boys and 1908 kcal for girls)] calculated based on the EFSA average requirements for children of age 11 with moderate physical activity lifestyle.
f. In regression models, during the organic diet treatment, participants in both groups had on average significantly lower levels of biomarkers of exposure to pyrethroids (3-PBA) (GMR=0.297; 95% CI: 0.237, 0.373; Q<0.001) and the odds of being below the LOD of neonicotinoids (6-CN) was higher in the organic period (OR=0.651; 95% CI: 0.463, 0.917; Q=0.035).
g. Significantly lower levels of the oxidative stress/inflammation (OSI) biomarker 8-OHdG (GMR=0.888; 95% CI: 0.808, 0.976; Q=0.035) were also observed during the organic period. A significant negative interaction between days of treatment and the dietary organic intervention was observed for 8-iso-PGF2a (GMR=0.984; 95% CI: 0.977, 0.99; Q<0.001) and MDA (GMR=0.995; 95% CI: 0.990, 0.999; Q=0.028), indicating a time-dependent reduction during the intervention period.
h. Linear mixed effect models of the OSI biomarkers of effect showed a significant (Q<0.001) influence of the pesticide metabolite (3-PBA) on the average levels of 8-OHdG (GMR=1.064; 95% CI: 1.033, 1.095) and 8-iso-PGF2a (GMR=1.058; 95% CI: 1.035, 1.081), but not for MDA; the 6-CN did not influence the average levels of the OSI biomarkers.

In conclusion, the ORGANIKO trial results showed: i) the clear benefit of an organic dietary treatment by significantly lowering the body burden of pesticides (pyrethroids and neonicotinoids), and ii) significantly lower levels of biomarkers of oxidative stress/inflammation as the likely result of the pesticides' body burden reduction in healthy 10-12 years old children in Cyprus. Such biomarkers of oxidative stress/inflammation are

considered as early stage markers for a suite of chronic conditions, such as obesity, type II diabetes, or cancer. This dataset could inform the EU and the USA pesticide risk assessment policies, including policies about organic agriculture. We plan on submitting these results as a tentative health claim of organic diet for children at EFSA headquarters within the first 3 months of 2020.

An open day event was organized for the participants and their parents on 28 April 2018, in which the results were presented and certificates were given to the participants by the Commissioner of the Environment, Ms. Ioanna Panayiotou. A live-link by a radio station covered the event and catering with organic food and drinks was available for the attendees. A manuscript with the trial's results was published to the PLOS ONE scientific journal on September 2019 and it is of note that the article underwent several review cycles (12 independent reviewers reviewed the article within PLOS ONE review process, possibly due to its originality). Following the study publication, personal results in the form of individual child reports were explained and shared with the parents who requested them, during an event that took place on 20 September 2019.

Action D1: Impact Monitoring – Project Evaluation

Foreseen start date: 08/15	Actual start date: 09/15
Foreseen end date: 05/16	Actual end date: 08/19

This action was the overarching evaluator that monitored all milestones and systems put in place to establish the timely completion of the deliverables. The monitoring of the indicators and deliverables was assessed in regular intervals. The only deviation was the sources of verification report, which wasn't submitted in the first EASME progress report but submitted in the next reports.

Activity D1.1: Monitoring protocol (CUT, ARI, DE, KC)

Foreseen start date: 08/15	Actual start date: 09/15
Foreseen end date: 05/16	Actual end date: 12/15

The monitoring protocol was proposed and agreed during the kick-off meeting and was included in the Guidance document that was submitted along with the midterm report. It

includes monthly reports, internal progress reports every six months (if a progress or midterm report is due then no internal progress report is delivered), consortium meetings every 6 months, meeting evaluation questionnaires after every meeting, financial and administrative reports every 3 months and a frequently-updated deliverables control tool.

Activity D1.2: Monitoring indicators list (CUT, ARI, DE, KC)

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Actual end date: 08/19

The final estimates for the key project-level indicators were inserted in the e-platform and their progress is presented in section 7. The progress of the indicators was assessed every 6 months. For the indicators of the GHG emissions and the coverage of the climate change impact, direct soil N_2O emissions have been monitored in the organic pilot farms of barley and apple orchards. The findings clearly demonstrated the superiority of implementing organic farming nutrient management schemes instead of chemical fertilizers. For the indicators related to Governance and Information and Awareness, the achieved progress was higher than foreseen and this was due to the wide dissemination of the project through different means in Cyprus, Italy and Belgium, the implementation of the children's intervention study in schools instead of the hospitals and the involvement of organic stakeholders in providing raw material for the study.

Activity D1.3: Sources of verification (CUT, ARI, DE)

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 05/18	Actual end date: 08/19

The sources of verification report included information on the methodology used for the monitoring of the indicators, the challenges faced and the corrective actions taken. This report was assessed after each consortium meeting and if needed, it was revised.

Activity D1.4: Socioeconomic impact (CUT, ARI, DE, KC)

Foreseen start date: 09/15	Actual start date: 09/15

Foreseen end date: 05/19 Actual end date: 07/19

In order to assess the socioeconomic impact of the project, a second consumer survey on the attitudes and perceptions of the public towards organic products was implemented. The methodology for the 2nd consumer survey was the same as to that executed part of Activity A1.2. The 2019 survey in comparison to the first survey in 2016, showed that:

a. 75% of consumers have bought organic foods, showing an increase of 15% compared to 2016. In addition, there was an improvement in the purchase frequency.

b. There was an increase in the percentage of households purchasing organic foods in comparison to conventional foods in 2019. The increase concerns all food categories.

c. Consumers, who participated in the 2019 survey, showed intention to pay more for organic foods in comparison to 2016. More specifically, only 11.5% of the participants (2016: 22.3%) do not intent to pay extra money for organic foods, whereas 31% (2016: 19%) intend to pay up to 25% more and 9.5% (2016: 5%) intend to pay up to 50% more.

The increase in the purchase of organic products and the intention to pay more may be attributable to the ORGANIKO project since we disseminated the benefits of organic farming and its products through multiple activities and occasions and hence, this might affected the public when considering the type of products to buy.

Activity D1.5: Ecosystem Function restoration (CUT)

Foreseen start date: 09/17 Actual start date: 04/18

Foreseen end date: 05/19 Actual end date: 05/19

The start of this action was delayed, because the C3 Action was delayed; however, the deliverable was delivered on time. The ecosystem function restoration study was prepared by taking in account the results of the Action C3, presenting a cost-benefit analysis of the provision of organic food in Cypriot schools. The proposed intervention of organic meals in Cypriot schools was estimated to be highly cost-effective using the WHO metrics of effectiveness for an intervention. This analysis is thus, a useful policy tool for the Cypriot government as it continues to tackle the childhood obesity pandemic in the island. Also, the ecosystem services potential of organic farming was assessed as well as the role of organic farming in mitigating climate change. Through the report, it is shown that the increase of

agricultural land under organic farming scheme has the potential to improve soil fertility in the long term and substantially reduce GHG emissions for barley and apples.

Action E1: Dissemination, Training and Exploitation of Activities

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Actual end date: 08/19

This Action dealt with the dissemination of the activities of the project. Various events have taken place in Cyprus in order to communicate the benefits of organic farming in terms of health and the environment and networking activities have taken place and are organized based on the networking plan developed in the Activity A1.3. The activities implemented from the beginning of the project until August 2019 were the following: 5 informative workshops for the public, 7 awareness programmes for children, 6 awareness programmes for parents, 2 live radio broadcasting events, 1 open day event, 4 educational workshops for farmers, 11 participations in relevant events, 2 short-chain organic markets at the Cyprus University of Technology, 1 expert visit from the Harvard University, 7 newsletters, 3 newspaper articles, 2 brochures, 5 interviews on the radio and television, 3 videos, visits to farmers, 1 European Parliament event, 1 international conference on climate change in Limassol, participations in 10 conferences with oral presentations or posters, publication of 4 scientific articles in prestigious international scientific journals, press releases on project events and activities on online blogs, newspapers, television and radio and in Italy: Organisation of 6 awareness programmes, 4 educational workshops for the local authorities and farmers, 4 technological and legislative workshops, 4 project team visits to relevant stakeholders, 3 public dissemination events.

After the end of the project, the following activities took place until November 15, 2019: 1 interview on the consumer survey results, 1 interview on the children's health study results, 1 event organized by the LIFE CYCLAMEN where the project results were presented to journalists. The journalists' event was highly disseminated with TV viewings in 4 TV channels, press releases in 10 online media and 1 newspaper.

Activity E1.1: Kick-off event (CUT, ARI, DE, KC)

Foreseen start date: 09/15	Actual start date: 09/15

Foreseen end date: 09/15 Actual end date: 09/15

The kick-off event was organised on 16-17 September 2015 with a high participation rate (around 100 people). The participants of the event were included in the mailing list of the project and are informed for the events and newsletters of the project. All the relevant material of the kick-off event was provided along with the mid-term report sent to EASME.

Activity E1.2: Development of website, blog and social interactive media (CUT, ARI, DE, KC)

Foreseen start date: 09/15 Actual start date: 09/15
Foreseen end date: 05/19 Actual end date: 05/19

The project's Facebook page was available for the public in November 2015 and by August 2019, it reached 861 likes. The project's website was developed around December 2015 and the Google Analytics were set in January 2016. During the period January 2016-August 2019, the website reached 8594 sessions, 6276 users and 64% bounce rate. The project's twitter page was developed in February 2016 with 96 followers and the project's Instagram page was set up on February 2019 with 83 followers. The website and social media development reports were attached in the midterm report. A website was set up for the CLIMATICO international conference and by August 2019, the website reached 2082 sessions, 3470 users and 57% bounce rate.

Activity E1.3: Notice boards (DE, CUT)

Foreseen start date: 09/15 Actual start date: 09/15
Foreseen end date: 05/19 Actual end date: 04/18

Two notice boards were set up on the Limassol-Nicosia highway during December 2017 and April 2018 and photos of the notice boards can be found in the second progress report.

Activity E1.4: Dissemination in international journals and conferences (CUT, ARI)

Foreseen start date: 09/17 Actual start date: 05/16

Foreseen end date: 05/19 Actual end date: 08/19

This activity started earlier than foreseen. During the project period, posters related to:

- the pesticides concentration in tap water and in organic diet were presented at the EPRW 2016 on 24-27 May 2016, in Limassol and at the International Society of Environmental Epidemiology global conference (ISEE) in Rome on September 1-4, 2016.
- organic diet and health were presented at the 3rd Public Health Symposium on 21 September 2017, in Limassol and at the International Society of Environmental Epidemiology global conference (ISEE) in Rome on September 1-4, 2016, at the ISES-ISEE 2018 Joint Annual Meeting in Ottawa on August 26-30, 2018.
- organic farming practices in the era of climate change, was presented at the 6th International Conference on Sustainable Solid Waste Management, in Naxos on 13-16 June 2018.

Presentations related to subjects such as organic farming, organic diet, pesticides and climate change took place at the EUFRIN 2015, on 19-20 November 2015, in Brussels, at the SANA 2016, on 9-12 September 2016, in Bologna and at the 7th Conference of the Scientific Society "Microbiocosmos", on 7-9 April 2017, at the International Society of Exposure Science global conference (ISES) in North Carolina on 15-19 October, 2017, at the international CLIMATICO conference (organized by us) in Limassol on 11-12 April 2019.

The results of the cross-over trial in children were published in the scientific journal PLOS ONE (https://www.ncbi.nlm.nih.gov/pubmed/31483785). A paper on the results of using alternative organic amendments on N2O emissions was published in the scientific journal, Journal of Environmental Management (https://www.ncbi.nlm.nih.gov/m/pubmed/31499464/#fft). A manuscript for the impact of different nutrient management practices of N2O emissions is under preparation and will be submitted to a peer reviewed journal for publication.

Activity E1.5: Daily workshop events, Open Days, and Live Links in CY and IT (CUT, ARI, DE, KC)

Foreseen start date: 09/15 Actual start date: 09/15

Foreseen end date: 05/19 Anticipated end date: 08/19

A number of communication events have taken place during the whole project period and below they are presented in chronological order with the number of people attended/viewed/informed. Relevant material is annexed for events that took place after June 2018 since for earlier events, the relevant material was attached in previous progress reports:

1. Public workshop on 16 September 2015, in Limassol (CUT). About 100 people attended the workshop and press releases were published on local newspapers and online news after the end of the workshop.
2. First consortium meeting on 16-17 September 2015, in Limassol for the project beneficiaries (CUT).
3. First study visit on 01-02 December 2015, in Rome for the project beneficiaries (KC).
4. Participation at the 1st Mediterranean Science festival on 4 December 2015, in Limassol with two workshops; an interactive seminar with activities around organic farming for about 50 children aged 6-12 years and an informative presentation about organic farming and the project for the general public, in which 15 adults participated (CUT).
5. A workshop for about 200 students on 18 December 2015, in Nicosia (ARI).
6. First legislative and technological workshop on 26 January 2016, in Rome with 15 participants (KC).
7. Second consortium meeting and EMT visit on 4-5 April 2016, in Limassol for the project beneficiaries (CUT).
8. Participation in the celebrations of the Europe Day on 7 May 2016, in Limassol (CUT). Project flyers were disseminated to about 200 people and about 50 people visited our kiosk.
9. First annual awareness programme on 6 June 2016, in Rome with almost 100 participants (KC).
10. Participation in the celebrations of the Global Wellness Day on 11 June 2016, in Limassol (CUT). Project flyers were disseminated to about 50 people and about 30 people visited our kiosk.
11. Participation at the workshop of the AgroLife project on 27 June 2016, in Lania which had 40 participants (ARI).
12. Participation in the event organized by the Work-Life Balance Committee on 29 June 2016 in Limassol with a presentation about organic food and the project for about 20 people from the CUT staff (CUT). An online magazine was developed with a summary of

the presentations and this was disseminated through email to the CUT personnel (about 400 people).

13. Second annual awareness programme on 7 August 2016, in Tuscany with almost 40 participants (KC).
14. First training course for local authorities and farmers on 8 August 2016, in Tuscany with almost 30 participants (KC).
15. Second study visit on 05-06 September 2016, in Bologna and third consortium meeting for the project beneficiaries (KC).
16. Seminar on "Organic Farming: The global answer to global warming" in collaboration with Federbio, within the framework of SANA 2016, on 12 September 2016, in Bologna with about 100 participants (KC).
17. Participation at the 10th Environment Festival on 18 September 2016, in Nicosia (CUT). Project flyers were disseminated to about 1000 participants of the festival.
18. Participation at the Researcher's Night on 30 September 2016, in Nicosia with about 50 students visiting our kiosk (CUT).
19. Lecture by an expert in the field, Prof Alex Lu, from the Harvard University on 19 October 2016, in Limassol with about 70 participants (CUT).
20. Second public workshop on 20 October 2016, in Nicosia with about 80 participants (ARI).
21. Six awareness-raising programmes for parents and school children starting from 13 December 2016 in Limassol (CUT). More than 600 students and 1200 parents were informed about the study and organic farming benefits either through a presentation at school or through flyers sent at houses.
22. Second Italian legislative and technological workshop on 16 February 2017, in Rome with more than 60 participants (KC).
23. Third annual awareness programme on 17 February 2017, in Rome with almost 30 participants (KC).
24. Second training course for local authorities and farmers on 1 March 2017, in Rome with more than 40 participants (KC).
25. Short-chain organic market at the university on 7 March 2017, in Limassol with about 80 people from the CUT staff visiting and buying organic products (CUT).
26. Live Link on 26 March 2017, in Limassol, for the children and parents participating in the study (CUT). Certificates were given to the first group of children that completed the

organic phase of the study and participants had the chance to try organic food items. About 200 parents and children attended the event.

27. First educational workshop for farmers on 3 April 2017, in Kyperounta with more than 20 participants (ARI).
28. Participation at the Mediterranean Science Festival on 27 April 2017, in Limassol with a workshop for about 50 children (CUT).
29. Fourth annual awareness programme on 11 May 2017, in Rome with more than 30 participants (KC).
30. Participation at the workshop of the AgroLife project on 19 May 2017, in Limassol with about 100 participants (ARI).
31. Second educational workshop for farmers on 22 May 2017, in Kissonerga with about 10 participants (ARI).
32. Third educational workshop for farmer and the public on 8 June 2017 in Nicosia with more than 70 participants (ARI).
33. Fourth consortium meeting with EMT & EASME visit on 9 June 2017 in Limassol for project beneficiaries (CUT).
34. Fourth educational workshop for farmers on 19 June 2017, in Dymes with more than 10 participants (ARI).
35. Participation at a stakeholders' organic dinner on 20 June 2017 in Nicosia, with a presentation on the preliminary results of the children's health study with about 100 guests (CUT).
36. Third training course for local authorities & farmers on 1 October 2017 in Rome with more than 30 participants (KC).
37. Third Italian legislative and technological workshop on 25 October 2017, in Rome with more than 60 participants (KC).
38. Participation at UNFCCC COP23 on 6-17 November 2017, in Bonn (KC).
39. Participation in the conference on 21 November 2017 organized by the Representation of the European Commission in Cyprus and the Non-Governmental Organisation Bone Vivo in Nicosia on the discussion for the draft report of the network on "Mediterranean diet and sustainable development" (CUT).
40. Third study visit on 20-22 November 2017, in Bolzano and Parma and fifth consortium meeting for the project beneficiaries (KC).

41. Fourth Italian legislative and technological workshop on 29 November 2017, in Rome with 40 participants (KC).
42. Second short-chain organic market at the university on 6 February 2018, in Limassol with about 100 people from the CUT staff visiting and buying organic products (CUT). The event was covered by a live link from a radio station.
43. Sixth consortium meeting with EMT visit on 13 April 2018 in Limassol for project beneficiaries (CUT).
44. Live link and open day for the presentation of the children's study results on 28 April 2018 in Limassol, with about 60 parents and children (CUT).
45. European Parliament event on 23 May 2018 in Brussels, with about 45 participants including five distinguished members of the European Parliament, during the 2018 Green Week (CUT, ARI, KC, DE).
46. Participation in a governmental meeting on 13 June 2018 in Nicosia to discuss the issue of illegal pesticides import from the occupied area (CUT).

    All relevant material for dissemination activities by June 2018 were submitted along with the midterm or second progress report.
47. Fourth training course for local authorities & farmers on 26 September 2018 in Rome with more than 30 participants (KC).
48. Fifth Italian awareness programme on 26 November 2018, in Rome with 30 participants (KC).
49. Sixth Italian awareness programme on 28 November 2018, in Rome with more than 30 participants (KC).
50. Fourth study visit on 6-7 December 2018, in Rome and seventh consortium meeting for the project beneficiaries (KC).
51. Fourth public workshop on 13 December 2018 in Limassol with 40 participants (CUT) (http://bit.ly/2XTFMvf).
52. Participation in a LIFE networking event, organized by the LIFE CYCLAMEN, on 13 December 2018 in Nicosia (CUT).
53. First dissemination event on 15 February 2019, in Palermo with more than 40 participants (KC).
54. Fifth public workshop on 21 March 2019 in Limassol with more than 40 participants (CUT) (Sigmalive, Showbiz, ladytimes, paideia news)
55. Second dissemination event on 15 February 2019, in Venice with more than 30 participants (KC).

56. Final international conference (CLIMATICO) on 11-12 April 2019 in Limassol with more than70 participants (CUT, ARI, KC, DE) (www.climatico2019.com).
57. Participation in a LIFE info day, organized by the LIFE CYCLAMEN, on 18 April 2019 in Limassol (CUT) (http://bit.ly/34olIDO).
58. Eighth consortium meeting with EMT visit on 31 May 2019 in Limassol for project beneficiaries (CUT).
59. Award of Michalis Omirou (ARI) from the CY President for his input on environment and sustainability within the framework of the project on 5 June 2019 in Nicosia.
60. Third dissemination event on 14 June 2019, in Milan with more than 30 participants (KC).

Moreover, following the project's end period, a few other events took place:

1. Communication and meeting with parents for their children's individual results based on the "Organic diet and children's health" study on 20 September 2019, with 20 parents.
2. Participation in a LIFE press event, organized by the LIFE CYCLAMEN, on 09 October 2019 in Limassol (CUT, ARI).
3. Participation in a workshop titled "Let's talk about ORGANIKO" organized by Rome's Agricultural and Forestry Sciences Doctors Association on 15 October 2019, in Rome with participants various governmental and non-governmental bodies who have urged the continuation of the work started with the ORGANIKO LIFE+ project (KC).

Activity E1.6: Strategic national plan of advancing organic farming sector capabilities in Cyprus (DE, CUT, ARI, KC)

Foreseen start date: 09/18	Actual start date: 09/18
Foreseen end date: 05/19	Actual end date: 06/19

During the last year of the project, the strategic plan was prepared following various meetings with the beneficiaries and interviews with them. The objectives of the strategic action plan are to: 1. Propose sustainable actions and measures to support and assist the more effective implementation of the existing "National Action Plan for the Development of Organic Agriculture" in Cyprus. 2. Analyze the existing conditions in the organic products chain from farm to fork in the Republic of Cyprus. 3. Extend the integration of organic products into GPPs. The strategic plan consists of concrete actions based on the two main pillars of the project: (a) Organic Agriculture and Climate Change Mitigation and (b) Organic Diet and

Health. Some of the proposed actions are strengthening of the Cyprus National Council of Organic Farming in terms of its responsibilities and available resources, use of short-chain organic markets, active implementation of the GPPs with addition of requirement for 25% of food to be organic in the relevant governmental departments, enhancement of existing training programs for young farmers, development of information workshops for the public, integration of modules on the development of environmental consciousness and the use of organic products as part of the "Environmental Education" course in primary schools, use of organic fruits and vegetables in schools, hospitals and army through the GPPs implementation. The action plan was submitted to the competent Ministry of Agriculture and, in particular, to the Cyprus National Council of Organic Farming. The Ministry responded that the action plan will be taken into account when preparing the national action plan for the development of organic farming.

Activity E1.7: International conference (DE, ARI, CUT, KC)

Foreseen start date: 09/18	Actual start date: 01/18
Foreseen end date: 05/19	Actual end date: 04/19

The final international conference, namely CLIMATICO 2019, took place on 11-12 April 2019 in Limassol, Cyprus. The conference's theme was Act on Climate Impact in the Mediterranean. The conference focused on the impact of climate change on key societal sectors, such as public health, agriculture, and food. Keynote speakers were (1) Dr. Lučka Kajfež Bogataj, Nobel Peace Prize Winner (2007), Former Vice-Chair of the IPCC, University of Ljubljana, (2) Dr. Laurent Philippot, Director of Research, French Institute for Agricultural Research (INRA) and (3) Prof. Sara Hallin, Swedish University of Agricultural Sciences. The conference was under the auspices of the Minister of Agriculture, Rural Development and Environment, Dr. Costas Kadis and was supported by the Commissioner for the Environment, Ms. Ioanna Panayiotou. A website for the conference was created (www.climatico2019.com) as well as a logo and banner for better dissemination of the conference. During the participants' registration, the participants received flyers produced by the ORGANIKO team (can be found in the project's website), along with the conference's program.

Attendees represented several countries, including Cyprus, Serbia, Germany, Greece, the Netherlands, Lebanon, Serbia, and Italy. The Minister of Agriculture, Rural Development and

the Environment, Dr. Kadis congratulated us, mentioning that it is the epitome of the efforts of the research teams and the policymakers participating in the ORGANIKO LIFE+ project. Dr. Kadis confirmed that he is supporting such efforts that promote innovation for a better environment while ensuring a stable agricultural development. Dr. Kadis further noted that Cyprus is already affected by climate change, mainly due to phenomena such as warming, prolonged droughts, and severe weather conditions. This is expected to cause significant negative impact for agriculture and food production and the loss of agricultural land as well as the depletion and deterioration of water and soil resources.

Since climate change is an international issue that affects health, life, and agriculture, there were many presentations that discussed them, including solutions and new approaches for solving these problems. Special attention was given to organic farming and methods of reducing the carbon footprint as well as methods for controlling greenhouse emissions by prioritizing other methods of energy consumption such as anaerobic biofuels and energy efficiency measures. Other conference sessions focused on health promotion methods for reducing plastic bag use, assessing environmental exposures to climate change related phenomena, such as dust storms, and evaluating perceptions of the public towards health impacts of climate change. All relevant material of the conference (book of abstracts, program, etc.) can be found in the conference website and a press release was prepared and published by various media such as Fileleftheros, Sigmalive, Studentvoice and Paideia news.

Activity E1.8: Benefits and risk communication to the public (CUT, ARI, DE, KC)

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 05/19	Actual end date: 08/19

Further to the events organized/participated, there have been other ways of public communication.

- Detailed guidelines for organic apple and barley production have been produced and are disseminated through the project's website.
- Seven newsletter issues have been produced by CUT and following feedback from the rest beneficiaries, they were disseminated through the beneficiaries' databases and the project's website, Facebook page and twitter account. The five first issues were attached in the midterm report and the second progress report and the last two issues can be found attached here.

- Five newspaper articles about organic farming and climate change, pesticides and health have been published in well-known Cypriot media; Simerini, Haravgi, Politis, Philenews and Cyprus News Agency. Four of the articles were annexed in the midterm report and the second progress report and the latest article can be found here (http://bit.ly/2Bg86xI).
- A banner was developed and was used in almost all communication events of the project in Cyprus in order to capture the audience's attention. Two types of leaflets were created by CUT (organic diet and health) and ARI (organic farming and climate change), that were disseminated in communication events in Cyprus.
- Two notice boards were set up in the Limassol-Nicosia highway from December 2017-April 2018, with the aim of engaging the public's attention to the project.
- There have been more than 20 press releases of our events and activities in online news, newspapers, electronic magazine, TV and radio.
- Several TV and radio interviews on the project activities and the results of the children's health study and the consumers' surveys.
- Three videos were produced with themes: (1) definition of organic farming and project's role (2) description of the children's health study (3) description of the organic farming related activities and the results from the GHG measurements. The videos were disseminated through the project's social media and gained the public's attention. Furthermore, the marketing company involved in the preparation of the strategic plan is preparing a video focused on the main results of the project and their impact. This video will act as an after LIFE tool for further dissemination of the project.
- The layman's report was prepared in English and Greek and was disseminated in various channels such as the project's website and social media. Hard copies will be administered to relevant Ministries and their departments (Agriculture, Health, Education), universities and schools.

Activity E1.9: Networking with other LIFE and/or non-LIFE projects

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 05/19	Actual end date: 08/19

In the European Parliament event, which we organized on 23 May 2018, members of the IFOAM organization participated, and IFOAM EU is one of the beneficiaries in the LIFE

project SOLMACC. This EU Parliament event allowed for the policy makers to interact with scientists that work on climate change mitigation projects in South Europe. The social cost and impact of such climate change-mitigating measures that are based on organic agriculture and organic diet were extensively discussed with EU officials. Also, we networked with other LIFE projects such as CLIMATREE, AGROLIFE, STYMFALIA, LIFE CYCLAMEN through participations in workshops they organized, email communication and skype meetings. Networking efforts also include those within the four study visits of the project beneficiaries in Italy. During the last year of the project, the networking activities were more targeted since we were able to present results from the demonstration actions of the project (Actions C1, C2 & C3) to the relevant stakeholders. A networking report was prepared in which the foreseen and actual networks achieved within the project are reported.

Action F1: Project management by Prof. Makris, CUT

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Actual end date: 08/19

This Action dealt with the management and coordination system of the project. The management of the project proceeded smoothly with the coordinator keeping frequent communication with the beneficiaries and ensuring the continuous monitoring of the deliverables. The delays observed in the Activity A1.2 and C3.1 didn't cause any issues to the project's implementation but instead increased its dissemination and impact since a larger number of people were informed about the project and a network of companies was mobilised for the implementation of the children's health study. We were overall happy with the progress and the management of the project by the team.

Activity F1.1: Define the project strategies and coordinate and manage the development of the project

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Actual end date: 08/19

With regards to the objectives of the Activity F1.1:

(a) During the kick-off meeting, the technical and management committees were formed and the advisory board was formed during November 2015.
(b) The task allocation plan was developed as part of the Guidance document.
(c) The consortium meetings were organized every 6 months.
(d) The progress reports to the EASME were sent on time and in order to achieve this, monthly reports were sent to the external monitor and internal progress reports were prepared every 6 months.
(e) Outreach activities were organized for the wider public and indicative timelines for the events that needed to be organized were sent to all beneficiaries.

Activity F1.2: Monitoring and implementation of all actions, tasks and deliverables in a timely fashion (CUT, ARI, KC, DE)

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Actual end date: 08/19

The actions done for the Activity F1.1 ensured the monitoring and implementation of all actions, tasks and deliverables in a timely manner. The Guidance document on governance and management, that was prepared by the CUT and sent to all partners and that was attached in the midterm report, providing the relevant information.

Activity F1.3: Scientific and time management (CUT, ARI, KC, DE)

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Actual end date: 08/19

Regular email communication between beneficiaries and face to face meetings ensured the overall scientific and time management of the project.

Activity F1.4: Audit (CUT)

Foreseen start date: 03/19	Actual start date: Not applicable
Foreseen end date: 06/19	Actual end date: Not applicable

No external audit was needed based on the letter sent by EASME on 25 November 2017, since none of the beneficiaries has an expected EU contribution that exceeds €325,000. Hence, this activity didn't take place.

Activity F1.5: Indicators (CUT, ARI, KC, DE)

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Anticipated end date: 08/19

Their progress is assessed in the section 7. Key Project-level Indicators.

Action F2: After LIFE+ communication plan

Foreseen start date: 09/15	Actual start date: 09/15
Foreseen end date: 08/19	Actual end date: 08/19

This Action refers to the plan and activities that will be done for the sustainability of the project after its end. Numerous ideas have been discussed among the ORGANIKO beneficiaries for the after-LIFE period of the project and in the after LIFE+ plan we describe the various activities that will ensure the effective dissemination of the project following its completion.

Activity F2.1: Post-ORGANIKO Activities (DE, CUT, ARI)

Foreseen start date: 01/19	Actual start date: 07/17
Foreseen end date: 08/19	Actual end date: 08/19

The post-ORGANIKO activities are reported in the after LIFE+ plan. Some of the activities that will be done with the aim of the continuous promotion of the project and its aims are: updates on the project's website and social media, use of banner and posters in public and governmental places, dissemination of the layman' report online and in public places, organization of short course for farmers and unemployed people on organic farming best practices and organization of seminars and workshops that promote consumer awareness, health benefits and environmental advantages of organic farming.

6.2. Evaluation of Project Implementation

Please evaluate the following aspects of the project:

- *Methodology applied: discuss the successes and failures of the methodology applied, the results of the actions conducted and the cost-efficiency of actions.*

  Action C1: The implemented methodology during action C1 followed several steps to map the already established protocols, identify the main drawbacks and problems in organic farming practices within Cyprus organic sector. Based on these findings we prepared several components of main practices like irrigation, nutrient management and soil fertility strategy schemes. We also collect soil samples to evaluate during the course of the project but also after its completion, baseline soil parameters in order to evaluate the impact of organic farming on them. The methodology for sampling and analysis of the data followed standard operational procedures and descriptive statistics were implemented. The Action, was cost efficient, however we strongly believe that increasing the number of participants (farmers) could increase and provide deeper knowledge regarding the fertility of Cyprus soils. However, the limited amount of budget and resources for this activity could not provide in depth analysis and was adequate to provide the baseline information for the Action C2.

  Action C2: During the implementation of Action C2 and particularly during the activity C2.1 besides the evaluation of the baseline information that was described during Action C1 we additionally introduced carbon stock modelling to assess the importance of the different practices on carbon sequestration that is an important climate mitigation practice. To achieve this task, we used the ICBM model that was calibrated in Sweden using local meteorological data. This model is appropriate when the available data for carbon stock changes are limited. The model equations and scripts are easily accessible and can be run using R-Package, Excel or SAS. The model gives rough estimates and is the most appropriate for our situation taking into account the lack of long-term data. For the measurement of GHG emissions and particularly N2O we developed, implement and calibrated the static chamber method. The concentration of the GHG was measured on a gas chromatograph equipped with an MS detector using a Q-Bond silica bond column. The main drawback of the method is the risk of missing main peak events during the growing season. To

minimize this risk, we calibrated the system and schedule the sampling procedure at regular intervals and within a time framework. In addition, we also test temporal changes in flux rates of N2O using a portable detector (46i Nitrous Oxide Analyzer). The use of an online continuous system could not be included as a methodology due to the high capital investment that is needed. In addition, testing the impact of different nutrient management practices on GHG emissions, the use of static chambers was the most cited method in literature.

Action C3: The initially proposed methodology had several drawbacks such as short intervention period, small sample size and large recruitment period (described in previous section). In order to overcome these issues, an amendment was required with an improved methodology. The advantages of the new methodology, except from the obvious ones (larger intervention period, sample size and shorter recruitment period), were the higher dissemination of the project since public schools are a good means to communicate efficiently the project to teachers, students and parents, the higher societal impact and the higher replicability and transferability of the results due to the focus on healthy children in schools. Also, the action is cost-efficient as by transferring funds from other categories without changing the total budget of the project, a large number of organic meals was prepared for a long(er) period of time. It is of note that the EU Parliament-based STOA report, which was published in December 2016 entitled "Human health implications of organic food and organic agriculture" reports that there is a lack of well-designed studies assessing the potential beneficial effects of organic food consumption to human health. Our study is designed in such way to avoid the limitations of the previous studies such as small population, short duration, and effect of specific foodstuffs instead of whole diet and hence it is expected that its results will be widely applicable with minimum bias. Based on the above, the approved technical change worked well to the benefit of the project.

- *Describe the results of the replication efforts.*

There have been some efforts to replicate the chamber-based greenhouse gas emission measurements in a Cyprus representative study design in all districts. This has taken the form of a proposal that was submitted to the government for possible funding. The proposal awaits decision. Also the possibilities of replicating the children's intervention study have been explored in two other countries, Italy and Lebanon.

Following discussions with the University Hospital of Parma (Prof. De Angelis), they had conducted a similar pilot study with 5 children. The study design was different in terms of preparation of the organic meals since the Italian study was sponsored by a supermarket and families used coupons to buy organic food from the supermarket and prepared it at home. The study duration for each individual included in the trial was 8 weeks: during the first 4 weeks the diet was conventional, whereas during the last 4 weeks the diet was organic. For 3 out of 5 participants enrolled, the study was extended to one more week after the end of the organic diet, when the participants returned to the conventional diet. The results of this pilot cross-over trial showed that the organic diet treatment did not reduce the body burden of the biomarkers of exposure to pyrethroids (3-PBA) and neonicotinoids (6-CN). The observed results may not be consistent with the results of our study; however, the small sample size of the trial needs to be taken into account. Another limitation of the trial is the fact that families were the ones responsible for buying the organic ingredients and cooking the organic meals. Hence, it is expected that there were differences in the organic products selection, cooking preparation and cooking quality and there was no control in place to assess that the meals were 100% organic. In parallel, the University of Balamand in Beirut, Lebanon (Prof. M. Mrad) is also interested to conduct a similar study and now are in the process of looking for funding. We also communicated our children's health results with EFSA officials in Parma during our third study visit in Italy. Our health intervention study was successfully registered in the US registry ClinicalTrials.gov; through the registry, easy access to information on publicly and privately supported clinical studies on a wide range of diseases and conditions is provided. We also submitted a proposal to EU TP Organics in order to replicate the children's health study in a larger scale (Southern Europe) with the aim of developing a sustainable food chain system at primary schools in Southern Europe operated by SMEs. Our proposal was among the shortlisted applications and the jury found it promising. The EU TP Organics platform featured it in the Innovation Arena on its website (http://tporganics.eu/organic-lifestyle-starts-at-primary-school/). We also submitted a proposal to the Cyprus RPF for exploitation of the children's study results and the implementation of a feasibility study in all-day schools by the replacement of conventional fruits and vegetables with organic ones.

In our replication efforts, the final conference in Cyprus by the end of the project that focused on the effects of climate change on agriculture, food and health offered a

platform for exchanging ideas and opportunities for replication by other organisations and other countries.

- *Indicate the <u>effectiveness of the dissemination</u> activities and comment on any major drawbacks.*

  The dissemination activities have proven very effective, since through them a large number of people got to know the project. In total, the dissemination activities in Cyprus and Italy engaged about 50,000 people (see section 6.1, Activity E1.5). The workshops organized in Cyprus were very successful, with lively discussions between the audience and the presenters. The events organized in EU, (including the Parliament Event in Brussels) helped towards the dissemination of the project outside of Cyprus to important stakeholders and policy makers. The study visits were effective in transferring the Italian knowledge on organic farming techniques and marketing to Cyprus and also in communicating the results of the project to high-impact organisations like IFOAM, AIAB and EFSA. The awareness workshops for children and parents in Cyprus were successful since about 1200 parents and more than 800 students learned about the project and its aim as well about the organic farming importance. The videos, developed by the project, were successful visual tools since they capture the public's attention; more than 3400 views for the video of the children's study, 820 views for the ARI activities video (it will gain more views since it was uploaded in early October 2019), 620 views for the video describing organic farming and the aim of the project and about 3500 views for other videos uploaded in the ORGANIKO LIFE+'s facebook page such as interviews and appearances in TV. The poster/presentation participations in European and international conferences & meetings with a few thousand visitors provided exposure of the project to stakeholders in Europe and worldwide and this can help towards the after-LIFE activities of the project and in the development of new networks. The TV interviews and radio interviews about the project results (e.g. children's study, consumer survey) were very effective since a few thousand people get informed through these means. Especially, the children's health study has gained a lot of attention by the public since a lot of people contacted us directly or indirectly (through radio programmes) to ask about the results of the study. The project newsletters developed were disseminated through the project website and social media and also sent to the beneficiaries' databases reaching a few thousand people. The articles on organic farming and climate change developed by the

beneficiaries and the advisory board were published in newspapers & online news, reaching a few thousand people. Press releases, relevant to the project, in online news and newspapers, were very effective in achieving a high dissemination of the project to a large number of people.

- *Policy impact*
    - *Describe project achievements which supported legislation (regional, national, EU)*
    - *Indicate the main barriers identified and the action(s) undertaken to overcome them*
    - *Describe any policy developments that resulted from your project activities*
    - *Describe how the project delivered the results foreseen in the Grant Agreement form B3 "EU ADDED VALUE OF THE PROJECT AND ITS ACTIONS". In addition, if in the Grant Agreement Form B1, the project has been labelled as significantly climate related and/or biodiversity related, cover these elements as well.*

The biggest policy impact of the ORGANIKO project is the design, development and final formulation of the strategic national plan for organic farming and its products within a climate changing scenario for the Republic of Cyprus. This strategic plan has been the key deliverable of the project and it was submitted to the competent Ministry of Agriculture for its consideration by the government. The government has notified us that it accepts the plan and will proceed with active implementation of it. Also, the ORGANIKO activities strongly supported EU and national legislation. In effect, firstly, the activities of the project supported the EU-wide GMO-FREE EUROPE movement and the Pesticide free Europe movement, since organic products, by definition, prohibit the use of genetically modified organisms and pesticides. The project actions A1, C1, C2 supported the EU strategy "From Farm to Fork". Through the organic farming practices as well as the stakeholders' mapping and the consumer perceptions report, we contributed to a better understanding of the food chain in general, because the quality and safety of food depend on the efforts of everyone that are involved from food production to consumption. The Actions C1 and C2 were aligned with the EU 2014 policy priorities in the area of climate change mitigation, since organic farming practices with low greenhouse gases that mitigate climate change and increase soil biodiversity and carbon storage were implemented. Moreover, these two implementation

actions contributed to the Decision 529/2013 which foresees that Member States will act with specific work plans for the LULUCF sector, which would set out measures to limit or reduce emissions. A key challenge for this sector still is collecting robust carbon data from agricultural soils and the development of robust, transparent rules that are practicable at an EU and global scale, thus, the results of these actions greatly contributed to it by focusing on carbon data collection for agricultural soils. Furthermore, the actions C1 and C2 supported the recent EU agreement in revising the rules on organic farming since protocols with simplified guidelines were developed that will encourage more farmers to switch to organic farming and will help current farmers to increase their productivity.

Through the Action C3, three relevant environmental policy legislations (COM(2008)400, EC 834/2007 and EC 889/2008) are relevant. The intervention study in children showed that children who follow an organic diet for a period of about 40 days had lower exposure to pesticides and improved oxidative stress and inflammation biomarkers. To our knowledge, never before an intervention study that assesses both biomarkers of exposure and effect has been conducted in children. Also, through this study, the European Environment and Health Process (EHP) was supported, which aims to reduce the adverse health impact of environmental threats.

Moreover, we made efforts to include organic food and sustainability as criteria in the catering services of universities, schools, hospitals, army, thus promoting the Green Public Procurement (GPP) in Cyprus. Specifically, we sent a letter to the Ministry of Education and Culture suggesting the incorporation of organic farming as a course in the curriculum of primary school and the addition of organic foods in the canteen. The Minister responded to our letter saying that our study is very important and we should disseminate our results to the Ministry so that they can act accordingly. Moreover, he added that for the next school years the school canteen menu includes some organic products. We further communicated this info to COFA and to the three main supporters (SMEs) of our study so that they can provide products for the school canteens.

The nearly non-existent organic-based product introduction into GPP practices in Cyprus was highlighted by Mr Theopemptou, member of the Parliament, who asked the three ministers of Education and Culture, Defence and Health why the provision of 50% of organic food is not applied in the relevant places (submitted along with the midterm report). The Ministry of Education and Culture and the Ministry of Defence responded to his question and sent a memo which encourages the use of organic food in the relevant canteens (submitted along with the midterm report).

Finally, the activities of the project support the EU rural development policy 2014-2020 (EU 1305/2013) on the short food supply chains topic, since a short-chain organic market was implemented already at the CUT with very promising feedback after communication with the university administration and COFA (submitted along with the midterm report). Discussions were made with COFA to establish a regular short-chain system in the university and/or in the municipality of Limassol for a larger impact. Furthermore, the fact that we were invited to a stakeholders' organic dinner where the leader of the governmental party and other members of the Parliament attended, was very important for policy-making since the children's health study was presented and discussed.

The STOA report on "Human Health Implications of Organic Food and Organic Agriculture" assesses policy options based on the literature review conducted on the subject. Through our project, we acted upon the policy option 3 (Support organic agriculture by investing in research, development, innovation and implementation), #4 (Improve the business environment of organic agriculture through fiscal instruments) and #5 (Support sustainable food consumption patterns). The policy option #3 was supported by the three implementation actions of the project (C1, C2 and C3). The Actions C1 and C2 helped farmers increase the organic production and lower their costs thus supporting policy option 4. Through our efforts to develop a short-chain organic market in the university, in the municipality, in primary schools and in the army we supported policy option 5. Also, through our communication with the Ministry of Education and Culture we convinced the Ministry to introduce organic food products in the new catalogues of the canteens for the school year 2017-2018 and onwards and hence we promoted the sustainable food consumption patterns and indirectly promoted the creation of new jobs and organic products.

6.3. Analysis of benefits

In this section please discuss the project's progress focusing on the results achieved. Justify any anticipated significant deviations from the targets set initially, and comment on targets already met or exceeded. In the case of the Final report, where relevant, refer to the final actual values of the Key Project-level Indicators (KPIs).:

1. *Environmental benefits*
    a. *Direct / quantitative environmental benefits:*
        i. *LIFE Climate Action: e.g. reduction of greenhouse gas emissions; increase of climate resilience; impact on related policies;*

The emission factors calculated in LIFE+ ORGANIKO are by far lower compared to those implemented by the DE during the National Inventory preparation for GHG emissions in agriculture. The project findings indicate that the application of composts and an appropriate design of crop rotations results in a significant reduction of GHG (N2O) emissions in organic farming systems. Implementation of these emission factors in barley systems is expected to reduce the National Emission Cost by €2.230.000 per year (personal communication with DE-Ministry). The team of the Agricultural Research Institute prepared a report for the Ministry of Agriculture to facilitate the adoption of the lower emission factors by the National Greenhouse Gas Emission Inventory. This is will be based on the manuscript that is under preparation for publication in a peer reviewed journal. The results of the project are transferable at least in EU areas having similar climatic conditions with that of Cyprus with minor changes and fine-tuning procedures (i.e. planting date, application rates of organic amendments etc). We already presented our findings in a workshop in the EU Parliament and communicated ORGANIKO findings with other LIFE+ projects like SOLMACC. Dr Omirou has been appointed as a member of the National Board for Organic Farming and through the Board it has been decided to promote ORGANIKO findings to the farmers through specific training activities for Cyprus organic farmers. ORGANIKO findings have been presented in a meeting in the Ministry of Agriculture held at 16/10/2019 and it was decided to design specific measures in the new RDP for the mitigation of climate change in agriculture based on the results of ORGANIKO. Finally, an informative note was prepared for the Minister of Agriculture describing the results of ORGANIKO

b. Qualitative environmental benefits

i. LIFE Climate Action: e.g. long term sustainable technology; better planning; change of behaviour; spin-off effect in other environmental areas etc.

Our findings show that the fallow-free rotation scheme promotes carbon sequestration in annual crops at least in the short term. Soil analysis and their evaluation to determine the plant nutrition management scheme is consider as a behavioural change activity which is expected to reduce GHG emissions overall. We expect that changing the behaviour not only of organic farmers but also of conventional farmers in this aspect will substantially reduce GHG emissions because of the reduction of nitrogen fertilizers due to a more sustainable use of this resource. An increase of organic amendments in Cyprus rainfed system is expected to increase the C sequestration in the short term. Measurements in pilot farms of ARI

demonstrate an increase of 0.12 to 0.25 tn/ha/year depending on the nutrient management strategies implemented. If the weighted average of these rates extrapolated in the area affected by ORGANIKO and through the increase of area under organic farming practices or the inclusion of organic amendments, then the C sequestered in the soil will be ranged from 50 to 70 tn CO2 eq/km2.

2. *Economic benefits (e.g. cost savings and/or business opportunities with new technology etc., regional development, cost reductions or revenues in other sectors); state the number of full time equivalent (FTE) jobs created, showing a breakdown in qualified/non-qualified staff.*

A number of activities resulted to economic benefits and the fuelling of green economy and green jobs in Cyprus. Firstly, the Activity C3.1 brought together a lot of organic SMEs market companies that were promoted through the dissemination activities of the study and a lot of people got to know their products. The SME company responsible for the preparation and delivery of organic meals to schools cooperated with two other organic companies of the sector, because the budget wasn't enough to provide five organic meals per day to 200 children for 40 days. These three companies contacted their associated companies and farmers in order for them to provide some products for free or at a much lower price. A total of 71 companies and farmers offered for free their products into the organic meals that had to be delivered daily to the participating schools and as such they were advertised through the relevant activities of the study and this resulted to an increase in the sales of organic products and hence a boost of the organic sector, widely. It is expected that these companies will have higher revenues and hence new direct and indirect employment might be generated. Moreover, a lot of parents were familiarised with organic products and the location of organic stores since they wanted to add some products to their children's diet during the organic phase of the study or because they wanted also the parents themselves to eat organic just like their participating kids, leading again to their familiarisation with the organic market and demonstrating an increase in the sales of organic products. Another activity that resulted to the promotion of the organic sector was the implementation of two short-chain organic market at the premises of the university (CUT). Following communication with the university administration and highlighting the importance of organic products by mentioning the implementation of the GPP, the university approved our request to organise these markets. A questionnaire was sent to the university personnel in order to see their interest and preferred times and their results were positive. The organic markets were organised in association with COFA and organic vegetables and fruits by several producers were available for the CUT personnel at the first market whereas in the second market a larger variety of products was available. The events

were advertised through emails to the university community and about 80 people visited the 1st market and about 100 people visited the 2nd market. During the 2nd short-chain market, a live link by a well-known radio station covered the event, thus the market dissemination was extended to the general public. The short-chain markets resulted to direct economic benefits since about 180 people bought organic products leading to an increase in the revenues of the organic producers and there was advertisement to about 1500 people (CUT personnel and public listening to the radio). There were discussions with COFA to implement the short-chain organic market regularly since a questionnaire after the end of the event showed that the university personnel is even more interested for a regular implementation of the market however constraints were faced with the university administration. Moreover, there were discussions with COFA for the hosting of a short-chain organic market at the municipality for the general public; however, the place where the Limassol municipality market was located wasn't available anymore due to Municipality rearrangements. We were also making efforts to incorporate organic products in hospitals, army and university cantinas through the implementation of the GPPs and our efforts were successful since the Cyprus Public Procurement Directorate signed a contract with suppliers / producers of organic food. In a recent letter (dated March 26, 2019) to the general directors of the three Cypriot Ministries (Education and Culture, Health and Defense), the list of the awarded organic products was presented and it was recommended that the aforementioned Ministries purchase organic food either based on this list or through tenders submitted by their departments. These activities will promote even further the organic sector. Moreover, additional personnel were hired for the implementation of the ORGANIKO activities at CUT and ARI, leading to 4 additional jobs. Also, business opportunities for Cypriot organic farmers in Italy have been developed, following contact with FederBio; two Cypriot organic farmers visited Italy for negotiations with Federbio to cultivate and export organic barley in Cyprus.

3. *Social benefits (e.g. positive effects on employment, health, ethnic integration, equality and other socio-economic impact etc.).*

Our project had social benefits such as positive effects on employment and economy (discussed in the section above) as well as on health and public education and training. The dissemination activities reached a large number of people (estimated around 50,000) that had the opportunity to learn about organic farming and its benefits, including healthy eating and organic diet lifestyle. The aim of Activity C3.1 was to demonstrate that systematic organic diet can impact positively to children's health by decreasing pesticides exposure and thus affecting some biomarkers of oxidative stress and inflammation. A total of 191 children had the opportunity to experience the systematic organic diet thus providing them a greener and healthier lifestyle, with less exposure to

chemicals. Moreover, the children needed to comply with the organic diet for a long period and this helped them to develop the skills of self-discipline and willpower, which can prove important in all the stages of their life. It is of note that through the study, we were aware of the social perception on tasty food. At the beginning of the study, we received numerous calls from parents about the taste and portion size of the organic meals; our project telephone center and its experienced researchers had to deal nearly daily with parents' calls about the progress of their child and how they could help in overcoming whatever impressions or perceptions their child had about the organic menu.

The organic meals were prepared as naturally as possible, without the addition of salt and based on the dietitian's guidelines. The Cypriot society is used to consider a food tasty, when it has excessive salt amounts and this is something that needs to change. Through the study, it is shown that a change in diet cannot be made from one day to another, because the organism needs time to adapt to the new lifestyle. The results of the study will hopefully encourage and promote this lifestyle change. The children that completed the organic phase received certificates in a live link that we organised, thus promoting the awarding of children that complete their target. Through this live link, some children were interviewed by the radio producer and one of them thanked us in public for the opportunity to participate in the study and added that children that didn't participate lost a lifetime experience. The study had a large impact to the society, since a lot of people emailed us, called us and even asked through radio programs when the results of the study would be available. One of the most famous morning radio shows in Cyprus (Kanali 6 radio station) that deals with the public questions and concerns providing them professional answers to their queries mentioned our study. A person of the audience asked the show to find out when the results of the organic diet study would be released. The show contacted us to find out and then they informed the audience of it, demonstrating that the project reached the public. Following the publication of the results, we disseminated them through the project's website and social media and sent press releases to all types of media and some interviews followed so the socio-economic impact was higher and it will continue to increase.

4. *Replicability, transferability, cooperation: Potential for technical and commercial application (transferability, economic feasibility - bankability, limiting factors, suitability for additional funding from other streams e.g. structural funds, EIB financial instruments, venture capitals, pension funds, responsible investors) including cost-effectiveness compared to other solutions, benefits for stakeholders, drivers and obstacles for transfer, market conditions, pressure from the public, potential degree of geographical dispersion, specific target group information, high project visibility (eye-*

catchers), potential for replication in same and other sectors at the local and EU levels, etc. State the project's likelihood of replication (high/low/zero), and if its replication is market-driven or policy-dependant. Specification of potential market/replication vehicles. Possibilities for complementarity with existing market players and/or other solutions/projects (bundling).

The results of the project can be used in other countries that face similar challenges in the organic sector in order to promote the organic market, educate children, families and farmers and raise a healthy eating and diet lifestyle awareness to the public. Additionally, the calculated emission factors could also be used as reference for the Eastern Mediterranean region as well as other territories of EU with similar environmental and climatic conditions. As discussed in the previous section (6.3), there have been discussions to replicate the Activity C3.1 in the countries of Lebanon and Italy. We organised the EU Parliament event in May 2018, where IFOAM members participated. This event helped in the replicability, transferability and dissemination of the project results based on the networking and communication between the participants. The final international conference organised in April 2019 increased the dissemination of the project in the European fora and helped in networking with relevant stakeholders that could replicate our results and promote the after LIFE potential of the project. A proposal was submitted for the call for Innovations 2017 by TP Organics with the objective of the development of a sustainable food chain system at primary schools in Southern Europe operated by SMEs. The idea for this innovation was taken by the children's health study and the EU TP Organics platform featured it in the Innovation Arena on its website (http://tporganics.eu/organic-lifestyle-starts-at-primary-school/), so others could see it and replicate it. We also submitted a proposal to the Cyprus RPF for exploitation of the children's study results and the implementation of a feasibility study in all-day schools by the replacement of conventional fruits and vegetables with organic ones. The proposal with the acronym PRISHEC was approved with a potential to highlight the project's replicability. The consumer survey methodology could be used from other countries such as Italy, to assess the consumers' attitudes towards organic food and assist in the better marketing of organic products. FAO included the children's health study in the database of Agroecology Knowledge Hub and this is very important for replicability and transferability purposes.

5. *Best Practice lessons: briefly describe the best practice measures used and if any changes in the strategy employed could lead to possible adjustment of the best practices.*

In order to implement the children's health study, a number of best practice measures were used. First of all, the budget of the study wasn't enough to cover the five meals per day for about 200 children for 40 days. So, we had to communicate with the three main players of the organic sector in Cyprus and ask them to cooperate in order to make the study possible. This task was particularly intriguing because these three companies are competitors but they managed to work collaboratively for the good of the study. In order to coordinate the delivery of the meals, a daily communication with the companies and schools was in place. At the beginning, we were getting a lot of phone calls from parents, who complained mostly about the quantity of the meals and sometimes about the taste, so we had to act as the link between the company preparing the meals and the parents/children. The way we dealt with the complaints was by listening carefully and writing them down, explaining them using our dietitian's guidelines. Also, we made regular visits to schools where we encouraged the children and reminded them the scope of the study. The children needed to feel that we cared about their needs so the personal visits made them feel more confident that they could complete the study. On the other hand, at the end of the day we were contacting the company with a summary of the complaints and asked them to make some modifications. The human organism needs some time to adjust to a new diet and in the case of the Cypriot society this transition is even harder, because people are used to eat three main meals of large quantity in a day while the intervention consisted of 5 balanced meals for every day. We had a high number of dropouts at the beginning, but we handled the situation in such way as to limit the dropouts as much as possible. It is of note that two out of the six canteens filed a complaint to the School services reporting that they lost money during the implementation of the study and that they want a reimbursement to cover their losses. On one hand, this means that the children complied with the organic diet and didn't buy non-organic food from the canteen. On the other hand, we needed to handle this situation but since we had all the necessary approvals to conduct the study (i.e. Ministry of Education, headmasters) the complaints weren't valid. Also, the canteens could react differently to the study; they could add organic snacks in their menu so that the children would buy from them but instead they preferred to file a complaint. The school canteens in Cyprus should follow the Ministry guidelines for their menu, but we noticed that in some of them there are lot of fatty snacks in prominent locations and only a few healthy choices. Regarding the consumer survey, we faced

challenges due to low recruitment. The solution was to combine the telephone interviews with personal interviews in public places. This practice was particularly important since due to this a large number of people were recruited and it will be replicated for the second consumer survey that we need to conduct at the end of the project and for future surveys The overall findings of ORGANIKO project clearly show that farmers should include in their practices soil and plant analysis as guidance for the establishment of best performing nutrient management strategies. The inclusion of legumes as living mulch in apple orchards during winter increases soil organic matter and reduce erosion intensity especially in mountainous areas. The implementation of compost could also be a valuable tool for the mitigation of GHG from agriculture. These findings have been also communicated to the Department of Agriculture during the consultation of the Ministry for the new CAP 2021-2028.

6. *Innovation and demonstration value: Describe the level of innovation, demonstration value added by EU funding at the national and international levels (including technology, processes, methods & tools, nature management methods, models for stakeholder involvement, land stewardship models, organisational & co-operational aspects).*

Various activities of the project present innovation and offer demonstration value that relates to green economy and jobs. Firstly, the GHG estimation and the evaluation of different nutrient management strategies on direct soil N2O emissions have been performed for the first time in Cyprus. In addition, also for the first time and through ORGANIKO, country and crop specific N2O emission factors (EF) have been estimated. The findings from these studies demonstrated that in rain fed systems the EF are by far lower than those proposed from IPCC and that the use of organic farming strategies could further reduce the emissions. In particular, the emissions factor of compost treated soil was substantially lower from that measured in soils received ammonium nitrate. Secondly, the children's health study is innovative in terms that no other study has assessed before both biomarkers of exposure and effect in children. It is the largest and longest intervention study that was conducted to assess the effects of organic diet based on the review conducted in Activity A1. Based on the literature review, the major limitation of most intervention studies is that they examined the effect of organic diet, based on a single food item, for a very short period of time and with a small sample size. We wanted to eliminate these limitations by providing an exclusively organic diet with 5 meals per day to about 200 children for a period of 40 days. The results of the children's health study can help the science community in understanding better the mechanisms under which pesticides affect

different parameters of health and further research can help elucidate the role of organic diet in promoting a healthier lifestyle. Moreover, the results can provide the basis and reinforce the idea of providing organic foodstuffs in the school canteens. Also, the consumer survey report is innovative in terms that no other consumer survey in Cyprus, described in such detail the behavioural model of the Cypriot consumer of organic food and provided suggestions for intervention actions. Innovation has included the bio and circular economic patterns to be improved in current organic farming: within the ORGANIKO project activities in Italy, a meeting to discuss both has taken place in Milan, on 15 November 2016, between Paolo Carnemolla, President of Federbio and Catia Bastioli, Kyoto Club President, CEO of Novamont, Italy's leading bioplastics producer, and Member of the European Bioeconomy Stakeholders Panel.

7. *Policy implications: Indicate any important achieved targets contributing to the future implementation, design or take-up of regional, national or European legislation. Please highlight any potential unintended impacts, bottlenecks or barriers to the implementation of your project due to regional, national or European legislation including recommended actions further to actions already taken to overcome these barriers.*

During the Carbon Farming Roundtable which took place on October 9, 2019 in Brussels, ORGANIKO LIFE+ was mentioned twice in presentations (also appearing on the slides) – first, by Ana Frelih-Larsen, in her intro presentation on the ongoing Carbon Farming study, and then also by Christine Müller, Policy Officer. Ms Müller suggested that the future evaluation of our EU School Scheme for Healthier Eating Habits (under the CAP) could consider ORGANIKO LIFE+ findings (the Scheme evaluation is in 2023), eventually leading to an extension of the current EU Scheme, with a respective Carbon/Organic Farming demand pull possibly being covered, steered by geo-explicit CAP strategic planning (connecting schools' "shopping lists" with close-by, raw material providing agricultural parcels and their owners/product marketers (i.e. open-minded farmers) and/or regional processing facilities).

A consensus declaration on healthy eating at schools as a primary means of tackling childhood obesity was unanimously signed by universities, governmental departments from three Ministries, parental and primary school associations, school teachers and NGOs at the event organized by the ORGANIKO LIFE+ team on December 13, 2018. The participants suggested a number of targeted recommendations to policy makers of education and health

with the objective to substantially promote the health and well-being of children in primary education:

- Enhancement of physical exercise time and teaching by specialized teachers
- Revision of contracts with canteens and upgrade of the operation of the Canteen Supervisors
- Compulsory education for all parents on child nutrition and exercise through the Parents' Committee
- Creation of restaurant in each school
- Further strengthening of bilateral ministerial partnerships since obesity is a multifactorial disease
- Conversion of all elementary schools to full-day schools with a specific diet that promotes healthy eating
- Creation of a systematic and in-depth intervention plan for school nutrition
- Establishment of a State Food Authority with a holistic approach to nutrition and health issues

It is of note that two months after this event, (February 20, 2019) the Cyprus Ministers' cabinet approved programmes for tackling childhood obesity. These include:

- Implementation of the World Health Organisation's European Childhood Obesity Surveillance Initiative (COSI)
- Implementation of a mobile phone application offering nutritional information and suggestions to children and their parents
- Introduction in schools of a lunch programme based on the Mediterranean diet
- Reinforcement of efforts for the reduction in advertisements for processed foodstuffs aimed at children
- Reinforcement of a programme on the education of parents
- Expansion of health programmes from pre-school to high school

The ORGANIKO LIFE + project team welcomed the above decision as it is fully aligned with the results and recommendations of the ORGANIKO LIFE+ team. The proposed measures are in the right direction and require constant monitoring and evaluation for effective implementation of the intervention measures targeting the Cypriot children.

A member of the project's consortium, Dr. M. Omirou was appointed as a member of the Cyprus National Council of Organic Farming. This council will work towards revising existing organic farming law in Cyprus. The findings of the project were discussed in the Parliament House of Cyprus in early April 2018 via a question made by Senate members (G.

Perdikis and Theopemptou) regarding the project's impact. The EU Parliament event that we organized on 23 May 2018, was very important for policy implications since among the participants were five distinguished members of the European Parliament, who were informed of the so far results of the project in terms of the organic diet role in improving health indicators and of the organic farming role in soil quality improvement and climate change mitigation.

It is of note that the MEP Mr. Mavrides, who attended our EU Parliament event, asked a question for the Commission on 5 June 2018 that was relevant to the theme of our event (http://bit.ly/2BLd20A). More specifically, he referred to the low share of organic market in Cyprus and to the fact that Cyprus is already facing climate change consequences. The question posed was: "To what degree is it aware of the scale of the phenomenon of climate change in Cyprus? Are there any studies that examine the extent and the dimensions of the problem?" The EU Commissioner on climate, Mr. Cañete responded and it was highlighted that the Commission is well aware of the challenges faced by Cyprus and because of climate change and the estimated losses due to extreme weather and climate-related events in Cyprus, between 1980 and 2016, were around EUR 390 million (http://bit.ly/2wqJpf7). It is of note that Mr. Cañete referred to 'Two additional LIFE projects are currently supporting the protection of public health and of urban municipalities against climate impacts in Cyprus." and it is likely that ORGANIKO is indirectly mentioned in his response.

One of our main targets in terms of policy was to introduce the use of organic products in public places through the implementation of GPP and our efforts focus especially in the incorporation of organic food in schools. The main difficulty is that the organic production in Cyprus isn't very high and there are specific quantities of organic products for a specific period of time.

Discussions have been made with COFA in order to prepare a proposal for the provision of organic food in the public tenders often published by the Ministries of Health, Defence and Education and Culture, for hospitals, army camps and schools, respectively, based on the GPP practices. We contributed to the discussions before the implementation of the Green Public Procurement plan for Cyprus which now includes organic food options for public authorities and organizations. We contacted the Ministry of Education and Culture early in the project, informed them about the study and suggested the use of organic products in the canteens and the incorporation of a course in primary schools on organic farming in the curriculum. The Minister responded positively and that they were expecting the children health trial results and it is of note that for the school year 2017-2018, the canteen menu included some organic

products. Following the publication of the results of the children's health study we sent a letter to the Ministry informing them about the study results and they expressed their willingness to exploit the ORGANIKO LIFE+ results in the schools and this will help in the uptake of policy in national level.

Moreover, in the initial letter sent to the Ministry of Agriculture, it replied that they need a constant and reliable supply of major quantities of organic food products and this had to be secured by COFA. So, limited supply can be a barrier towards reshaping existing policies in Cyprus. Following discussions with COFA they prepared a list with products that can be available throughout the year and the available quantities and a contract was signed between the Cyprus Public Procurement Directorate and suppliers / producers of organic food. In a letter (dated March 26, 2019) to the general directors of the three Cypriot Ministries (Education and Culture, Health and Defense), the list of the awarded organic products was presented and it was recommended that the aforementioned Ministries purchase organic food either based on this list or through tenders submitted by their departments.

Because of the potential implications also for the organic farming sector, the ORGANIKO partners have been monitoring EU and national bioeconomy and circular economy developments, notably: (A) The EU Bioeconomy Strategy adopted in February 2012, whose review and updating is foreseen for this year and for which Member States are responsible for the adoption and implementation of national bioeconomy strategies. (B) The EU Circular Economy Package and Action Plan and the national Circular Economy Strategies. An element of policy implication is that our findings suggest that we are overestimating the GHG emissions from the agricultural ecosystems in Cyprus, leading to higher costs. We communicated these findings to DE and in particular to the Climate Change Unit of the Ministry of Agriculture and actions are expected to be taken to reduce the emission factors (EF) for barley crop at a minimum before considering inclusion of other crops.

7. Key Project-level Indicators

Assess the project's progress towards achieving the Key Project-level Indicator (KPI) targets. In the case of the Final report, please enter the final actual values of the KPIs for your project in the online KPI database (https://webgate.ec.europa.eu/eproposalWeb/kpi) making sure that values reported are justified and consistent with the environmental, economic and social benefits reported in the preceding section. In this section please provide an analytical comparison with the targets at the beginning of the project.

The KPIs values for the project end (August 2019) are described in the table below. Moreover, other indicators were used (i.e. social media, implication of organic companies) and are described and justified in the documents attached. It is of note that 2 months after the project's end, indicators related to the dissemination of the project have increased drastically i.e. number of users in the project's websites increased to 8790 (compared to 8358), and number of people reached through dissemination activities increased to 33732 (compared to 31312).

Indicator code	**Indicator description**	**Start value**	**Foreseen end value**	**Actual end value**	**Beyond end value**
1.5	Project area/length (ha)	100	200	200	400
1.6	People influenced by the project (no)	0	19000	51630	58000
4.3	Soil biodiversity (ha)	500	400	400	100
8.1.1	CO_2 emissions (kilotons/year)	107	87	85	60
8.1.2	N_2O emissions (kilotons/year)	118	90	90	60
8.2	Carbon sequestration (tons $CO2/km^2$)	850	1000	950	1000
10.2	NGOs and other stakeholders	1	5	37	40
11.1	Average visit duration (minutes)	0		2:09	2:10
	No. of unique visits/sessions	0		12064	14000
	No. of individuals	0		8358	10000
11.2	publications, press releases, newsletters	0		12	20
	brochures, newspaper articles, layman's report, strategic plan, instructions for farmers	0		10	20
	videos, live-radio events, interviews	0		10	15
	workshops for public, students, farmers, parents in Cyprus, participations in	0		70	80

	relevant events, events in Italy, conferences, expert visits, open day, short-chain organic markets				
	banner and notice boards	0		3	5
12.1	Pupils (of school age)	0	500	600	1000
	Laymen (parents)	0	800	1200	1500
	Students (in higher education)	0	300	200	300
12.2	professional training or education - farmers	0	50		150
13	Jobs	0	2	4	25
14.1	Running costs/ operating costs during project (€)	0	977951	977951	1000000