









## WASTEREUSE

Best Practices for Agricultural **Wastes** Treatment and **Reuse** in the Mediterranean countries

## After-LIFE Communication Plan

Project co-funded under the LIFE+ Program



### www.wastereuse.eu



## contents

Recycling of Agriculture (AW)	4
The WasteReuse Objectives	5
Conclusions and Recommendations	6
Aims and objectives of the WasteReuse Communication Strategy	8
Target audiences and key stakeholders	9
Key Communication Actions	10
Communication through printed material and videos	12
Communication after the project end	14
Virtual environment	14
Decision Making Tool	15
Publications in the line of WasteReuse LIFE10 ENV/GR/594	16
Project Identity	18

#### Recycling of Agriculture Waste (AW)

Recycling of AW through land application for plant uptake and crop production is a traditional and proven waste utilization technique. If properly done, it is an environmentally sound method of waste management resulting in economic benefits due to the reduction of commercial fertilizers use. However, although organic matter and nutrients could be beneficial for soil fertility and plant growth, potential serious soil degradation should always be considered due to very high concentrations of inorganic elements and polyphenols, sometimes near or above thresholds. Moreover, the addition of the insufficiently stable organic matter present in wastes, although it leads to the general increase in soil organic matter, may induce a number of negative effects on soil properties and plant growth, such as increase in mineralization rate of native organic carbon or release of phytotoxic substances that may have negative effects on plant growth.<sup>1,2</sup>



#### The WasteReuse Objectives

The WasteReuse project addressed two significant environmental problems:

- the uncontrolled disposal of agricultural wastes (olive oil mill wastes, wastes from the wine industry, etc) as well as, their uncontrolled use for crops/land fertilization.
- the excess use of nutrients and natural resources (water, phosphoric minerals used for the production of fertilizers) and the potential to increase recycling of nutrients and water with sustainable use of treated - or potentially untreated agricultural wastes.

The main objectives of the project were:

- The evaluation of innovative as well as, traditional technologies for agricultural wastes treatment regarding their suitability for crop cultivation.
- The development of Alternative Cultivation Practices for the most widely cultivated and water consuming crops in Mediterranean by recycling nutrients and water from AW via identification and development of Best Management
- The development of practices for waste application to main market crops aiming at maximizing yields and minimizing offsite environmental impacts.
- The protection of soil quality from the disposal of processed and unprocessed AW by developing and using cultivation practices which are suitable for representative, including degraded and vulnerable, Mediterranean soil types.
- The reduction of carbon footprint by recycling AW and minimizing the use of fertilizers. Conservation of natural resources from excessive use and uncontrolled wastes disposal.
- The increasing of competiveness of Mediterranean agricultural products and profits via the reduction of external inputs.



Cereti, C.F., Rossini, F., Federici, F., Quaratino, D., Vassilev, N., Fenice, M. Reuse of microbially treated olive mill wastewater as fertilizer for wheat (Triticum durum Desf.). Biosour. Technol. 91 (2004), 135-140

Komilis, D.P. Karatzas, E., Halvadakis, C.P. The effect of olive mill wastewater on seed germination after various pre-treatment techniques. J. Environ. Manag. 74 (2005), 339-348.

WASTEREUSE

04/05

#### Conclusions and Recommendations

WasteReuse showcased that increasing the recycling of nutrients and water with the application of sustainable methods and appropriate technologies for the reuse of AW could have various and multiplied environmental and economic benefits. On the condition that all necessary measures are taken to ensure safe and effective use of AW the potential of the tested methodologies and technologies is great, both for farmers and for the environment. In order to maximize the positive impacts of reusing AW and to mainstream its application, the research conducted in the WasteReuse project concluded that further action is needed in this field, that could be summarized in the following points:







- a Create a coherent regulatory framework for compost, similar to sewage sludge, by harmonizing current national rules or by enacting a common legal framework on a EU level for the content, handling, storage and use of compost
- Promote the use of organic wastes as alternative to mineral fertilizers and revise accordingly the European Fertiliser Regulation (463/2013) in order to align the policies on treatment of agricultural waste with the circular economy strategy of the EU and to reduce the use of fertilizer through the recycling of agricultural wastes
- **C** Foster and disseminate cultivation practices related to the circular economy and based on the recycling of different types of AW after their careful characterization
- **d** Promote the use of zeolite in improving plant growth and preserving soils and water bodies from the negative effects deriving from high nitrate concentration
- e Assign the ECOLABEL brand to composts
- f Encourage plant-based composts for the production of peat
- **9** Take into account toxicity for the characterization of AW before and after treatment with a view to i) select the most appropriate treatment technologies which should reduce the toxicity of treated AW to acceptable levels, ii) define the use of the final products and iii) define the optimum management strategy of the secondary wastes produced in order to eliminate adverse impacts on humans and environment
- h Reduce carbon footprint of agricultural production through proper recycling of nutrients
- Promote the reduction of pesticide use by exploiting biological control of plant pathogens and suppressive properties of selected compost
- Engage with all key stakeholders in Europe to disseminate successful practices for reusing AW and for receiving feedback and listening their concerns about the use of compost
- **k** Promote a renovated approach to agricultural production based on a more aware use of resources

#### Aims and objectives of the WasteReuse Communication Strategy

#### i. Communication for AWARENESS

The communication for awareness aimed to inform the target audiences (e.g. local authorities, agricultural associations) for the project's work and outcomes

#### ii. Communication for UNDERSTANDING

At a second level, a deeper understanding of the project's work and research findings was targeted for the primary stakeholders' groups.

#### iii. Communication for ACTION

"Action" refers to a change of practice resulting from the adoption of products, materials or approaches offered by WasteReuse.



#### UNDERSTANDING

#### AWARENESS

#### Levels of the WasteReuse project communication strategy

#### Target audiences and key stakeholders

#### PRIMARY AUDIENCES

- National Governments responsible for implementing agricultural policies
- Statutory agencies responsible for implementing regulations and specific relevant functions
- Landowners
- Farmers
- Agricultural associations
- Experts and scientists from research organizations and Universities
- Planning agencies and authorities in Mediterranean area
- Businesses/industries operating in the agricultural waste market
- EU representatives, MEPs and country-specific Ministers
- EC LIFE team
- Societal stakeholders

Farmers and agricultural associations are mainly interested in the short-term effects of the application of AW, such as crop growth and yield as well as AW treatment cost for the production of compost. On the other hand, policy makers and local authorities are mainly interested in issues pertinent to minimization of AW disposal cost, reduction of the environmental impacts and improvement of the quality of life.

A networking database with interested stakeholders (605 contacts so far) has been created and includes organizations and members from the scientific community, the agricultural sector and national authorities to disseminate project outcomes. Members of the network have been informed with newsletters, press releases and policy briefs.

















#### Key Communication Actions

The WasteReuse Consortium organized workshops with local stakeholder in Murcia, Spain and in Albenga, Italy, where the project results, were presented and debated with practitioners in order to acquire their feedback and more practical insights and opinions from professionals in the areas of waste treatment and agriculture. In addition a multi-stakeholder forum at EU level, entitled "Towards Sustainable Use of Agricultural Waste", was organized in collaboration with the European Economic and Social Committee in Brussels. In the WasteReuse Forum experts from other projects and from organizations working on the fields of sustainable agriculture and waste treatment presented their views, experiences and best practices regarding the use and treatment of AW.





#### WASTEREUSE



Brochure



Poster



Rollup





#### Communication after the project end

Once the project is completed, the following activities will be carried out, in two formats:

#### VIRTUAL ENVIRONMENT

#### i. WasteReuse Website

From the website created for the project, the project information will continue to be available at the website of the project. All simplified reports are available in pdf format for the users and the interested stakeholders.

This virtual tool in five languages has been actively used for the dissemination of the reports in real time, constantly updated, as the documents were being prepared and the activities were taking place. The website of the project will be available at least during the next five years once the project is completed, until August 2020; since the website of the



WasteReuse website - Home page

WasteReuse project is linked to the Signosis website, and the management of both of them will be certainly done. It should be mentioned than during the four years of the project duration there were 27.547 pageviews, while approximately 7.000 users had 9.773 sessions. Furthermore, all explanatory videos and the final Forum workshop are available for the interested stakeholders.

#### http://www.wastereuse.eu/?page\_id=1160

A CD-ROM including several maps (e.g geological, aquifer media) created by TUC regarding Spanish and Italian demonstration areas, has been prepared and given to the Spanish and Italian partners (20 copies each) to be forwarded to local/regional authorities and any other interested stakeholders free of charge.

The official edition with the wasteReuse project's results and the Layman's report will be distributed by Signosis to the 605 stakeholders of WasteReuse network. Furthermore, the project will provide to selected stakeholders a usb stick with the key results of the project and the tools developed during the project implementation.

The beneficiaries will concentrate their efforts on the continuation of the WasteReuse related research in different EC instruments (eg Horizon2020 and Life forthcoming calls).

The WasteReuse Decision Making Tool (WDMT) is an online guide and planner, based on empirical research from a range of relevant experiments and demonstrations in selected Mediterranean countries and is free for producers to figure the most suitable compost type to be used for a specific crop in a certain area and climate conditions and to learn about important aspects of the different types of organic waste. The WDMT is the WasteReuse country-level database regarding the composition, restrictions of use, price and producers of different types of composts, as well as of the cultivations for which these composts are appropriate. The WDMT was developed by the WasteReuse Project to help farmers understand the sustainable treatment and use of agricultural waste in an effort to promote the use of organic wastes as alternative to mineral fertilizers and to foster and disseminate cultivation practices related to the circular economy.

It also enables the research community to use the WDMT as a wiki platform to benchmark and include their relevant findings for other countries, crops or types of wastes in a unified and accessible online database for all European countries. An additional use of this tool is to assist policy makers to assess and measure the effectiveness and impact of cultivation practices integrating the reuse of agricultural wastes.

The WDMT will be available in the website after the end of the project, for further updates from scientists, researchers and practitioners working with the agricultural waste field and the beneficiaries of WasteReuse project will continue their efforts to integrate it as a practice from different stakeholders seeking information to make informed decisions by scientific evidence.

#### **DECISION MAKING TOOL**

#### ii. Meetings and agricultural waste events

The WasteReuse beneficiaries will attend, both as invited participants or as speakers, all the forums, events and waste related sessions that we are invited to, by the organizations related to the subjects dealt with in the project or the relevant administrations in this area. Following the experience acquired in the past four years of the project implementation the beneficiaries of the project WasteReuse have accumulated new scientific insights in the agricultural waste reuse issues and in the effects of the soil, air and

The Weathfreeze Di reportment and down stand for a specific crap- width is the Washing With the Mer Washing with the particular the measure angle or figure of variant maps or figure of variant	extrans finding that (PDDMT) is use initial distances in elevant Mohlem invest in extra a startist man and distance inception (Mohlem is and the startist initial distances inception) is appropriate, as well as of the cubic of a signal extransion of mohlem is of a signal extransion of mohlem is distances and the initial of the signal of the promoving to call the MOTIME as an at a sufficient extransion of million and management the difficult extransion of million and management that difficult extransion of million and management extransion of million of the size of the difficult extransion of the difficult extransion of the difficult extransion of the difficult extransion of the difficu	e guilte and planner, based a from and is have to posture a composition, ventriching a composition, ventriching a composition, ventriching a composition, ventriching a composition, ventriching a composition and is its faulte an composition and is its faulte and set and accommo- cated accommo- tion and accounting accounting and in collegiane, practices in a	In experiture means in the six space of neuroad to figure the mean states compared type to be spaced of the efficient gives of engines reach to ensure the efficient gives of engines (types of the real experiphile). The efficient of an of approximate experiment of between experiments of the efficient of experi- te discontinuous space of the efficient of experi- ments of the experiment of the experiment of the compared of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of the experiment of th
Intern Decembry 11	Beauty by [2]		Search to Mana 2
Table .	*   Parts		AT - Consum than past and many meture
17   Dampasi Yaon piat and da Record	og han an Cutherine	Deals	
TT Desegues have good and dis Researd Collection for which the special rule	og værer Diffestore	Date:	inge Perlan
T Compare how part and de Second Outputs to take to assume the National Second	Approximate Contractions Section sectors Contractions	Dialas educardis calification sectors	tage Postaw at a region for Stick scrady. 1996
To Deseguest here goes and else Senses Collection types for which its senses into the sense of the senses the sense of the senses the sense the senses the sense of the senses senses.	en maren Charles Annels Contres Contres an maren	staala edaamata edaamata santa	tage Pecker at a region that BDA speedson (MI)

water within the Mediterranean agriculture sector, which ensures that they will be invited as experts to future relevant events within the sector. Without any doubt, all the networking developed in the past more than 2 years of project will continue to give results, even exponentially as it is occurring already.

All the digital documents prepared as a result of the project will be communicated again after the end of the project to the regional associations related to the sector, environmental organizations, universities, the media, etc, always incorporating the LIFE logo of the project that was co-financing the project in the first place. Even though the project has ended, the methodology that was used at the different awareness, information and communication actions will be used as good practices in other projects, both at agriculture waste projects, rural development projects or any other relevant focal areas. A close contact will be kept with the experts group and with the representatives from the collaborating organizations that participated in the project, so that they will collaborate in the future LIFE projects.

#### Publications in the line of WasteReuse LIFE10 ENV/GR/594

#### JOURNALS

- Hernández T., C. Chocano, J.L. Moreno and C. García (2014). Towards a more sustainable fertilization: Combined use of compost and inorganic fertilization for tomato cultivation, Agriculture, Ecosystems and Environment 196, 178–184, http://dx.doi.org/10.1016/j.agee.2014.07.006
- Hernandez T., C. Chocano, J.L. Moreno and C. Garcia (2014). Organic wastes as alternative to inorganic fertilizers in crop cultivation, Acta Horticulturae 1028, 371–376
- Komnitsas K. and D. Zaharaki (2014). Assessment of Human and Ecosystem Risk Due to Agricultural Waste Compost Application on Soils: A Review, Environmental Forensics 15, 1–17, DOI: 10.1080/15275922.2014.950775
- Bartzas G., F. Tinivella, L. Medini, D. Zaharaki and K. Komnitsas (2015). Assessment of groundwater contamination risk in an agricultural area in north Italy, Information Processing in Agriculture 2, 109–129, http://dx.doi.org/10.1016/j.inpa.2015.06.004
- 5. Bartzas G., D. Zaharaki and K. Komnitsas (2015). Life cycle assessment of open field and greenhouse cultivation of lettuce and barley, Information Processing in Agriculture; in press
- Bartzas G., D. Zaharaki, M.T. Hernández-Fernández, J.L Moreno and K. Komnitsas (2015). Assessment of aquifer vulnerability in an agricultural area in Spain using the DRASTIC model, Environmental Forensics; in press
- Komnitsas K., G. Bartzas and M.T. Hernández-Fernández (2015). Assessment of groundwater vulnerability to pollution in Barrax, Albacete, Spain; submitted to Acta Horticulturae
- Hernández T., C. Chocano, J.L. Moreno and C. García (2015). An alternative to conventional mineral fertilizers in intensive lettuce crops: using organic wastes for a sustainable agriculture; submitted to Soil & Tillage Research journal (under revision)

#### CONFERENCES

Komnitsas K., D. Zaharaki, M.T. Hernández, J.L. Moreno Ortego, C.G. Izquierdo, F. Tinivella, G. Minuto, L. Medini, D. Micharikopoulos and E. Tavlaki (2012). Best practices for Agricultural Wastes (AW) treatment and reuse in the Mediterranean countries (WasteReuse), Proceedings of the ATHENS 2012 International Conference on Sustainable Solid Waste Management (in CD-ROM), Athens, Greece (28-29 June), http://uest.ntua.gr/athens2012/. This conference was a LIFE 20th anniversary event and was organized by the National Technical University of Athens in the framework of the LIFE08 ENV/GR/000566 DRYWASTE project.

- 2. Komnitsas K. and D. Zaharaki (2012). Identification of weighted indicators for the evaluation of agricultural waste treatment technologies, Proceedings of the 4th International Conference HSWMA (Hellenic Solid Waste Management Association) on Solid Waste Management in Crisis: New Challenges and Perspectives, Athens, Greece (30 November - 1 December), http://conference2012.eedsa.gr/. p. 629-636
- 3. Komnitsas K., D. Zaharaki and D. Vamvuka (2013). Factors affecting quality of compost produced from agricultural waste: assessment of risk, Istanbul International Solid Waste, Water and Wastewater Congress 2013 (in CD-ROM), Istanbul, Turkey (22-24 May), http://istanbul3wcongress.org/, p. 1315-1324
- 4. Hernandez T., C. Chocano, J.L. Moreno and C. Garcia (2013). Organic wastes as alternative to inorganic fertilizers in crop cultivation, VI International Symposium on Almonds and Pistachios (poster presentation), Murcia, Spain (27-31 May), http://www.ishs.org/symposium/205
- 5. Hernandez T., C. Chocano, J.L. Moreno and C. Garcia (2013). Comparación de fertilizantes orgánicos (como lodos de EDAR) frente a inorgánicos. IX Congress Jornadas Técnicas de Saneamiento y Depuración - Technological Research and Innovation in Urban Wastewater Treatment (poster presentation), Murcia, Spain (20-21 November)
- 6. Hernández T., C. Chocano, J.-L. Moreno and C. García. (2014). Organic wastes as substitute of inorganic fertilization in tomato crop, XII International Conference Protection and Restoration of environment (abstract presentation), Skiathos island, Greece (29 June-3 July), http://www.pre12.prd.uth.gr/
- 7. Hernandez T., C. Chocano, J.L. Moreno and C. Garcia (2014). Organic wastes as fertilizers for a more sustainable agriculture in lettuce cultivation, XII International Congress of the Croatian Society of Soil Science (poster presentation), Dubrovnik, Croatia (22-26 September), http://www.congress-csss.org/
- 8. Hernandez T., C. Chocano, J.L. Moreno and C. Garcia (2015). Organic wastes as alternative to inorganic fertilizers for a more sustainable agriculture, III International Symposium on Organic Matter Management and Compost Use in Horticulture (poster presentation), Murcia, Spain (20-24 April), http://www.verticesur.es/congresos/CFH2015/index.php
- 9. Zaharaki D., F. Tinivella, L. Medini, M.T. Hernández, C. Garcia, J.L. Moreno, D. Vamvuka and K. Komnitsas (2015). Effect of biochar and zeolite addition on the toxicity of anaerobically digested sewage sludge, III International Symposium on Organic Matter Management and Compost Use in Horticulture (poster presentation), Murcia. Spain (20 - 24)April), http://www.verticesur.es/congresos/CFH2015/index.php
- 10. Komnitsas K., G. Bartzas and M.T. Hernández-Fernández (2015). Assessment of groundwater vulnerability to pollution in Barrax, Albacete, Spain, III International Symposium on Organic Matter Management and Compost Use in Horticulture, Murcia, Spain (20-24 April), http://www.verticesur.es/ congresos/CFH2015/index.php
- 11. Tinivella F., A. Minuto, D. Zaharaki, L. Medini, M.T. Hernández, C. Garcia, J.L. Moreno Ortego and K. Komnitsas (2015). Effetto dell'aggiunta di biochar di segatura e zeolite sulla gualità di compost derivante da rifiuti agricoli (English title: Effect of sawdust biochar and zeolite addition on the quality of compost deriving from agricultural wastes), SOI 2015 Technical Conference: Growing substrates for horticultural and nursery crop production (poster presentation), Pescia, Italy (27-28 May), http://viv.entecra.it/soi.php

#### **Project Identity**



Best Practices for Agricultural **Wastes** Treatment and **Reuse** in the Mediterranean countries

Project No: Project Duration: Project Budget: LIFE10 ENV/GR/594 01/09/2011 - 31/08/2015 1.384.799 € • EU contribution: 679.399 €

CONSORTIUM

**Coordinating Beneficiary** 



Technical University of Crete, Greece

**Associated Beneficiaries** 

CEBAS-CSIC Institute, Spain



Centro Regionale di Sperimentazione e Assistenza Agricola, Italy



LABCAM s.r.l., Italy

Signosis Sprl., Belgium

Project Manager: Prof. Kostas Komnitsas, Technical University of Crete email: komni@mred.tuc.gr

**Dissemination Manager: Ms Elena Tavlaki,** Director Signosis, Belgium **email:** elena@signosis.eu

# WASTEREUSE





Copyright © 2015, SIGNOSIS Sprl. • Project co-funded under the LIFE+ Program



## www.wastereuse.eu

LIFE10 ENV/GR/594