

**“Best practices for Agricultural Wastes
(AW) treatment and reuse in the
Mediterranean countries”**



LIFE10 ENV/GR/594

Project co-funded by EC LIFE+ Environment Policy &
Governance



Project duration: 01/09/2011–31/08/2015

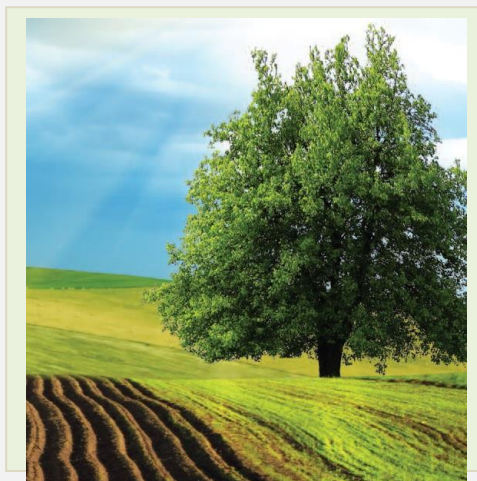
Website: www.wastereuse.eu

Total budget: 1,384,799 €

EC funding: 679,399 €

Beneficiaries contribution: 705,400 €

**7th Newsletter
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WASTEREUSE main objectives were:

- Evaluation of innovative and traditional technologies for AW treatment regarding their suitability for crop cultivation
- Development of alternative cultivation practices for the most widely cultivated crops in the Mediterranean region
- Protection of soil quality from the disposal of AW
- Development of Best Management Practices
- Reduction of carbon footprint in agriculture
- Increase competitiveness of Mediterranean agriculture

Coordinating beneficiary

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Why treatment and reuse of AWs is required?

- ✓ AWs such as olive oil mill, winery, livestock farm wastes, are produced in huge quantities in many countries.
- ✓ AWs have high content of recalcitrant compounds and are characterized as potentially hazardous when disposed untreated on soil or in water bodies.
- ✓ AWs reuse has several advantages including (i) production of fertilizers and reduction of raw materials needs (eg. phosphate ores), (ii) reduction of carbon footprint of agricultural processes, (iii) reduction of environmental risk for soils and waters in agricultural areas, and (iv) water savings
- ✓ Practice towards “zero waste” approach

Starting activities – lab experiments

Initial assessment of existing AW treatment technologies has been successfully implemented during the first 10 months of the project. All available data regarding funded projects focused on the development/implementation of technologies for the treatment of AW produced in the Mediterranean region have been collected, aiming to assist the selection of the most suitable, environment friendly, low cost technologies to be used for the development of alternative cultivation practices for the main water-nutrient consuming crops in Spain and Italy.

Laboratory experiments have been considered in Spain and Italy, to evaluate untreated and treated wastes produced using different technologies, as well as to assess their suitability for crop production and quality improvement and their potential effects on soil properties.

Around **35 different soils and 60 treated and untreated AW** (compost from plant residues and organic fraction of urban solid waste, pig slurry treated with fly larvae, biochar from vegetal wastes, olive mill wastewaters, alperujo, sheep manure, etc.), have been collected from Spain, Italy and Greece and characterized.



Tomato cultivation at CEBAS-CSIC



Basil cultivation at CERSAA

Demonstration in Spain and Italy

Demonstration activities have started on April 2013 in Spain and Italy to demonstrate the feasibility of the application of AW in open field and greenhouse cultivations with cereals and vegetables.

Two demonstration areas in Spain:

- Las Tiesas area in Barrax, Albacete, open-field cereal (barley and soft wheat) cultivations, ii) Tres Caminos area in La Matanza, Santomera, cultivation of tomato and lettuce in greenhouse

The Italian demonstration area is located in Albenga, Province of Savona, Liguria region. Greenhouse cultivations of basil, rocket and lamb's lettuce as well as open-field cultivations of rosemary, lettuce and cabbage were carried out. Open-field cultivation of cabbage was also carried out at a private farm at Loano, Savona, Italy.

Spanish demonstration area: the effect of different fertilization treatments (organic, mineral fertilizer and their combination) as well as irrigation with wastewater (pig slurry liquid fraction) of tomato and lettuce in greenhouse was considered. The effect of combined organic and inorganic fertilization on cereal growth (barley and wheat) in open field was also evaluated.

Italian demonstration area: cultivation of different vegetables and aromatic plants (lettuce, rocket, lamb's lettuce, basil, rosemary and cabbage) was implemented in greenhouse and in open field. Data collected from cultivation tests were considered to define the effect of different factors (compost application rate, addition of zeolite or fertilizer) on biomass production of vegetables and aromatic plants.



Greenhouse cultivations



Open-field cultivations

A “Code of Waste Management Best Practices for AW Application”, a decision making tool for policy makers and farmers, has been developed, aiming to a sustainable agriculture.

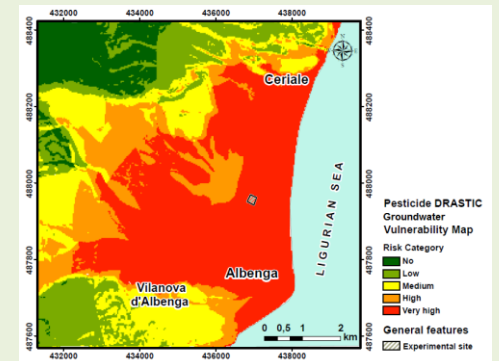
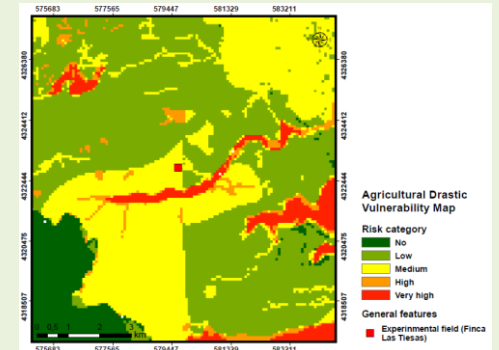
Risk analysis is carried out to assess risks for a recipient (soil, water, air), as a result of action (e.g raw materials extraction, waste disposal, agricultural activity). Risk Analysis (mapping and modelling) was carried out by considering the use of a well-established risk assessment methodology (DRASTIC approach). Parameters such as geology, permeability, land use, precipitation-evaporation, depth of water table and potential pollutants in the studied areas, were taken into consideration.

Life Cycle Analysis (LCA) is used for the quantitative assessment of the environmental, economic and social impacts (soil, water and air) during the life cycle of a process (eg. Industrial, agricultural) or product. A complete LCA for all processes considered in Spain and Italy, in terms of raw materials consumption, energy use and emissions was carried out by TUC.

The structure of the LCA framework includes all life cycle stages and integrates typical inputs and outputs, using GaBi 6 software. Five environmental impact categories were assessed in the LCA study: global warming potential, acidification potential, eutrophication potential, ozone layer depletion, photochemical ozone creation potential and cumulative energy demand as an energy flow indicator.

The results show that, in a general overview, impacts were different for the open-field cultivations in the two countries, while the greenhouse cultivations of lettuce showed quite similar results in both demonstration areas.

The importance of including compost production in the assessment was demonstrated, as it was the major GHG and energy contributor.



Vulnerability maps (up: Barrax, Spain – down: Albenga, Italy)

- AWs can be treated and reused in agriculture, offering substantial benefits.
- Risk and LCA analysis should be carried out to compare impacts of existing and alternative agricultural practices.
- AWs can definitely become a resource.



Dissemination

- The project website www.wastereuse.eu will be maintained, in 5 languages (English, Greek, Spanish, Italian and French), for at least five years after its end
- Facebook (<https://www.facebook.com/WasteReuseProject?fref=ts>) and Twitter (@WasteReuse) fan pages are continuously updated.
- The project published newsletters with the most important news and results, on a regular basis (register [here](#)).
- Two workshops in Albenga, Savona, Italy and Murcia, Spain and one conference in Brussels, Belgium, have been successfully organized within the last year of the project.
- Visits of farmers, interested stakeholders and students at demonstration areas in Spain and Italy have been organized.
- So far, four papers have been published in scientific journals and ten papers/posters have been presented in international conferences.
- The project has been presented by all beneficiaries in various events, such as workshops and seminars related to agricultural waste management and meetings with beneficiaries of other LIFE projects. Wastereuse leaflets have been distributed to the participants of these events.
- Other dissemination activities include presentation of the project's objectives and progress in newspaper articles, digital media and radio interviews.



For more information, visit our website (www.wastereuse.eu) or contact us
This newsletter was prepared by TUC with the contribution from all partners

