POLICYBRIEF

Best practices for Agricultural Wastes Treatment and Reuse in the Mediterranean Countries

Policy-relevant findings from the WASTEREUSE project LIFE10 ENV/GR/594

Policy Brief 1 – April 2014 **On-going Project**

INTRODUCTION

WasteReuse aims to develop new and alternative agricultural practices with the use of treated (or potentially untreated) agricultural waste (AW), which affects, besides the production itself, the quality of soil, water and air by considering the effect of the significant parameters as soil properties, soil-climate relation and environmental conditions.

What is Agricultural Waste

Agricultural wastes (AW) can be defined as the residues from the growing and first processing of raw agricultural products such as fruits, vegetables, meat, poultry, dairy products and crops. This term includes both natural (organic) and non-natural wastes produced through various farming activities such as dairy farming, horticulture, seed growing, livestock breeding, grazing land, market gardens, nursery plots and even woodlands. AW can be in the form of solid, liquid or slurries depending on the nature of agricultural activities. Agricultural and food industry residues and wastes constitute a significant proportion of worldwide agricultural productivity (estimated at over 30%).

High pollution potential of Agricultural Waste

Although the quantity of wastes produced by the agricultural sector is significantly low compared to wastes generated by other industries, the pollution potential of agricultural wastes is high on a long-term basis. For instance, the land spreading of manures and slurries can cause nutrient and

organic pollution of soils and waters. Given animal excreta also contains a plethora of organic chemicals and pathogens, the risk for surface- and groundwater contamination can be high.

AW treatment for a “cleaner” waste

Many projects relative to AW treatment technologies have been funded within European Funding schemes and especially LIFE. Most of them focused on the development of innovative technologies for waste treatment as well as, for the improvement of production processes, which further produce “cleaner” wastes. Apart from European research/scientific institutions, several SMEs have also developed technologies aiming at improving quality of the final products, minimizing waste volume and thus environmental degradation caused due to waste disposal. The Directive on the landfill of waste (i.e. Council Directive 1999/31/EC) defined requirements for European Member States to set up a national strategy for the implementation of the reduction of biodegradable waste going to landfills. According to the Article 4 of the Waste Framework Directive 75/442/EEC as amended (CEC 1991), landspreading is preferable when agricultural benefit is achieved, meaning when the application of a waste to land improves soil conditions for crop growth whilst ensuring the protection of environmental quality in the broadest sense. Moreover, Directive 2008/98/EC obliged Member States to take appropriate steps to focus on reducing the environmental impacts of waste generation and waste management, thereby strengthening the economic value of waste.

AW in Mediterranean countries

AW produced in Mediterranean countries, depend on the agricultural activity and contain residues from the processing of raw agricultural products such as fruits, vegetables, meat, poultry, dairy products and crops. The AW that are produced in very big quantities in the Med region include olive oil mill wastewaters, wine, swine and animal waste and rice straw.

Using ECOLABEL

The ECOLABEL brand, which was initially established by the Regulation 880/92 and was revised by Regulation 1980/00, could be appointed to soil improvers using organic matter deriving from waste treatment. Criteria for the appointment of an EU brand relevant to the ecological quality for soil improvers were established by EC with decision 94/923/CE. The ECOLABEL Decision CE 688/2001 introduced new criteria and parameters for the extension of the brand due to the extensive use of substrates for the cultivation of potted plants.

Development of alternative agricultural practices

Collection and analysis of soils

WasteReuse collected and fully analyzed eleven agricultural soils from 6 different Spanish autonomic Regions (Murcia, Castilla La Mancha, Andalucia, Cataluña, Valencia Community and Castilla León) as well as 5 Greek soils from several places of the Municipalities of Rethymnon and Hania (Crete) from 01/10/11 to 31/03/12. These soils can be considered as representative of Spanish and Greek agricultural soils. Furthermore, similar lab experiments were taken place in Italy with the aim to evaluate processed and unprocessed wastes and wastewaters as derived from different methods/technologies applied in Italy. Such trials assessed waste suitability as soil amendments, their capacity to promote crop production and quality and their potential effect on soil properties.

Organic wastes have a bio-stimulant effect

Most of the assayed organic wastes proved to have a positive effect (bio-stimulant effect) on ryegrass, melon, barley, wheat and maize seed germination and plant growth. As it has been observed the studied organic wastes are suitable products for recycling in soil used for agricultural purposes. They have an important load of organic matter that will contribute to improve soil organic quality and fertility, increasing the pool of organic C in the soil by fixing C in soil colloids thus avoiding C losses.

Organic waste to improve and fertilize the soil

Although the main function of organic wastes in soil is to act as soil improvers, they can also act as fertilizers due to the considerable amount of macro and micronutrients they contain.

Composting, one of the most promising and used techniques for waste treatment

The chemical characterization of the studied wastes has revealed that nutrient content in wastes is more closely related with the nature of the waste than with the treatment method used for its stabilization, whereas the rate of waste organic matter mineralization and the risk of phytotoxicity derived from the use of the end-product are greatly influenced by the treatment technology. In this sense **composting seems to be one of the most promising and used techniques for waste treatment**.

Solar drying, the economic alternative for mass reduction

A further possibility for mass reduction is drying of the sludge in a **solar dryer**; the technology has proved to be suitable and highly cost efficient for small to medium sized sewage treatment plants. Almost no maintenance is needed, and the achieved evaporation rates per square meter were up to three times higher than in conventional sludge beds.

The innovative use of fly larvae

Therefore, solar drying could be an economic alternative to conventional drying systems, especially in areas with proper climatic conditions. The **use of fly larvae is an innovative waste treatment** but the ammonium content in the end-product is too high (2.5-3%) and it is not a widely used methodology.

Organic wastes, the alternative of mineral fertilizers to decrease energy costs

Organic wastes could improve the physical and microbiological characteristics of the soils where they are applied. However, due to the fact that organic wastes act as fertilizers of gradual liberation, it is probable that they cannot cover all crop nutrient demand and organic fertilization has to be complemented in parallel with inorganic fertilization, but **the reduction of such inorganic fertilization is an important goal**.

Caring about the soil of the future

The effects of organic waste addition will be more noticeable after several years of adding the organic amendment to the soil. Co-utilization of various wastes is a matter of paramount importance in waste treatment since it allows the elimination of several wastes at the same time and combines wastes with complementary characteristics in order to give a higher added value to the end product.

Organic materials to improve mineral fertilization for crop

Organic materials like composts can be profitably used as substrates and for the fertilization of soils but they can supply only a fraction of the nutrients that are totally needed by the crop. Therefore mineral fertilization is anyway essential in order to restore the overall needs of the crop. The use of compost as organic amendment, together with a direct supply of mineral nutrients (N, P, K, Mn, Mg, Fe) that are released during the mineralization of the organic matter, can also:

- cause a mobilisation of the organic sources in the soil;
- increase the availability of the mineral nutrients already present in the soil;
- increase the effectiveness of the mineral fertilizations.

The key issue about the possibility to safely and productively adopt composts for cultivation of different crops is its compliance to defined quality standards that apply to all the compost productive chain (plants and equipment, processes and products).

Policy Recommendations

Promote the use of organic wastes

The use of organic wastes as alternative to commercial chemical fertilizers constitutes an energy saving apart from the benefit of avoiding soil erosion and degradation and loss of soil fertility. Because organic wastes represent a potential source of considerable agronomic, energy and economic value, their proper and efficient use as fertilizers should be promoted by national and EU authorities in developing strategies for increasing agricultural productivity and stability. The use of organic wastes as alternative to mineral fertilizers will help to reduce natural resources consumption and energy costs, as well as the risks of groundwater contamination derived from inorganic fertilization.

Assign the ECOLABEL brand to composts

WasteReuse provides indications about the possibility to use composts for the cultivation of some key crops defining amounts that can be applied in order to assure a correct establishment of the crop (on average: 25--□30 t/ha for open field crops, mixture of 20 to 40% (v/v) compost with natural soil or peat for potted plants). From an ecological point of view, the use of compost can have an important added valued due to the possibility of being assigned the ECOLABEL brand that is recognized at EU level.

Encourage plant-based composts for the production of peat

The use of plant based composts can represent a key element in the production of peat-free products that have a broad variety of applications for plant cultivation and that can, at the end, be integrally constituted by recycled/processed wastes and by products coming from different productive sectors.

Take into account toxicity for the treatment and use of AW

Toxicity is a very significant parameter for the characterization of AW and it should be taken into account before and after treatment 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. Pre-treatment of AW, careful application on soils, use of standardized procedures to evaluate toxicity and determination of the fate of contaminants in soil and water will maximize sustainability in agriculture and minimize impacts on ecosystems.

Project Identity

PROJECT TITLE: *WasteReuse - Best practices for Agricultural Wastes (AW) treatment and reuse in the Mediterranean countries*

FUNDING SCHEME: LIFE + Environment Policy and Governance

Project No: LIFE10 ENV/GR/594

CONSORTIUM:

- Technical University of Crete
- CEBAS-CSIC Institute
- Ce.R.S.A.A. – Centro Regionale di Sperimentazione e Assistenza Agricola
- Azienda Speciale per la Formazione Professionale e la Promozione Tecnologica e Commerciale della Camera di Commercio Industria e Agricultura di Savona (Laboratorio Chimico CCIAA)
- Signosis

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DURATION: 01/09/2011 – 31/08/2015

BUDGET: 1.384.799 € **EU contribution:** 679.399 €

WEBSITE: http://www.wastereuse.eu