



**LIFE + Environment Policy and Governance**

Project Number: LIFE10 ENV/GR/594

Duration: 01/09/11 – 31/08/15



**Project:** Best practices for agricultural wastes (AW) treatment and reuse in the Mediterranean countries

[www.wastereuse.eu](http://www.wastereuse.eu)

**Action 5** – Development of alternative agricultural practices.  
Demonstration in greenhouse and field experiments (Spain)

***“Alternative methods for cultivation of main market crops under Spanish climatic conditions with the use of treated agricultural wastes. Guidelines for successive implementation by growers/scientists. Evaluated data regarding production cost and environmental and social benefits”***

Prepared by: CEBAS-CSIC

CEBAS-CSIC coordinator: Prof M<sup>a</sup> Teresa Hernández Fernández

Dpt. Soil and Water Conservation and Organic Waste  
Management

Campus Universitario de Espinardo, Ed. N<sup>o</sup> 25

Apartado 164

30100, ESPINARDO-MURCIA, SPAIN

email: [mthernan@cebas.csic.es](mailto:mthernan@cebas.csic.es)

Reviewed by: D. Jose Antonio Pascual Valero, Scientific Researcher of CSIC

Report due: 31/03/2015

Report submitted on: 31/03/2015

## Contents

	Page number
Executive summary .....	3
1. <i>Use of organic wastes in crop production</i> .....	4
2. <i>Spain main market crops</i> .....	5
3. New practices for cereals and vegetables cultivation .....	7
3.1. <i>Considerations for the selection of the organic waste and dose</i> .....	8
<i>pH management</i> .....	10
<i>Nitrogen management</i> .....	10
<i>Phosphorus and potassium management</i> .....	12
<i>Secondary nutrients and micronutrients</i> .....	13
3.2. <i>Cereal cultivation: Winter wheat and barley and Spring maize</i> .....	13
<i>General nutritional needs</i> .....	13
<i>Wheat nutrient requirements</i> .....	15
<i>Barley nutrient requirement</i> .....	16
<i>Maize nutrient requirements</i> .....	16
<i>Fertilizing recommendations for cereals and corn</i> .....	17
3.3. <i>Horticultural crops</i> .....	19
<i>Needs of nutrients</i> .....	19
<i>Times and moments of fertilizer application</i> .....	20
<i>Tomato cultivation</i> .....	21
<i>Lettuce cultivation</i> .....	24
4. Evaluated data regarding production costs and environmental and social benefits .....	25
5. References .....	26

## **Executive summary**

In this deliverable Spanish main market crops have been described as well as the benefits derived from using organic wastes as alternative to inorganic fertilizers in crop cultivation. The successive use of organic wastes as total or partial substitutes of inorganic fertilizers enhances soil quality increasing organic matter and nutrient pool and in turn, prevents soil from erosion and degradation processes. General considerations for the selection and management of the organic wastes and their application dose have been stated. Recommendations about the calculation of the amount of nutrients to be added on the basis of soil inputs and losses, the application of topdressing N fertilization, and time of fertilization are also given.

The general nutritional needs of cereals and horticultural crops have been discussed and a guideline for the successive implementation of the new cultivation practices using organic wastes as fertilizers in cereals, corn and horticultural crops is also provided. Practical soil fertility management for using OW in crop production starts with obtaining a soil test. Amendments added should be based on the soil test results and the requirements of the crop being grown. The nutrient content (at least the major nutrients N, P, K) of the organic fertilizer or amendment should be known before application. Composted organic wastes are the preferred source of organic fertilizer; however, depending on the cost of the OW, the expense of these amendments may be much greater than conventional fertilizer sources. However, these increased costs have to be evaluated by also considering the long-term improvement in soil tilth and biological activity, potential environmental benefits, and the potential for higher returns from organic products.