



# REFERTIL

Recycling for sustainable resource management

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## Reducing mineral fertilisers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products

Improvement of comprehensive bio-waste transformation and nutrient recovery treatment processes for production of combined biochar and compost natural products



REFERTIL has the mission to contribute to the efficient and economical transformation of food industry by-products and farm organic residues from a costly disposal process into an income generating activity.



Food grade bone meal input for ABC



3R zero emission biochar production unit



ABC: Animal Bone bioChar product

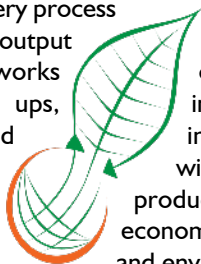
## Background

Intensive farming practices and human activities have disturbed the natural cycles of nitrogen and phosphorus. Industrial agriculture relies on continual inputs of mined and non-renewable phosphorus and energy-intensive nitrogen supply. It is estimated that human activity has doubled the global amount of reactive nitrogen in circulation; while tripled the amount of phosphorus since the industrial revolution. There is a strong need for increased sustainability and closing the nutrient loop in agriculture with the creation of a virtuous cycle between urban and rural areas. In this context, reducing the use of mineral fertilisers and chemicals in agriculture are key priority objectives that can be achieved by recycling and reusing treated organic waste as compost and biochar products.

## Purpose of the project

REFERTIL provides EU-28 standardized, advanced, and comprehensive bio-waste treatment and nutrient recovery process performance with eco-safe output. REFERTIL development works economical industrial scale ups, engineering for the benefits and improved output products compost and biochar nitrogen that can be farmers. As a result, both food and a new bio-economy is generated.

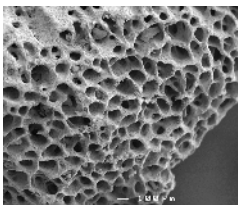
improvements towards zero emission compost and biochar products. The cover fields from applied science to including industrial technology interest of the SME farmers. The will be safe, economical and standardized products containing phosphorous and economically and beneficially used by SME and environmental safety is improved, while a



## What is biochar material and how is it made?

Biochar is plant and/or animal biomass by-product or organic waste based stable carboniferous substance for conservation agriculture applications. Biochar is produced under reductive thermal conditions. The biochar must be well defined and controlled quality. Biochar is applied chemical and/or biological range of organic feed production, subject to not to compete with nutrition production and environmental and climate

to improve the soil physical and/or properties or the soil activity. A wide materials can be used for biochar sustainability requirements, such as human food, animal feed and plant supply; and originating from protection sustainable supplies.



Plant Based Biochar (PBC) is a soil improver, while Animal Bone bioChar (ABC) is an organic P-fertilizer or both. Properly produced biochar has the potential to restore the soil natural balance and benefits crop production economics by improved water and nutrient retention, leading to drought tolerance and soil fertility for food crop production with economical importance.

## What is compost material and the composting process?

Compost is a humified solid particulate material, which has been sanitised and stabilised; and which confers beneficial effects when it is added to soil, used as growing media constituent, or used in another way in conjunction with plants. Composting is a process of controlled decomposition and humification of biodegradable materials under managed conditions, which are aerobic and which allow the development of temperatures suitable for mesophilic and thermophilic microorganism as a result of biologically produced heat.

## The REFERTIL policy support work

The REFERTIL project provides continuous policy support works for the European Commission (DG Industry and Enterprise and other DGs) related to the revision of the Fertiliser Regulation (Reg. (EC) No 2003/2003), and the possible regulation inclusion of compost and biochar, such as organic P fertilizer (ABC) and soil additive (PBC).



## Summary of the REFERTIL main activities

1. Identification, sampling and quantification of the main urban organic waste and agriculture organic residue flows and logistic systems in the participating countries.
2. Development of a detailed pyrolysis technology and biochar product matrix database ranking the available biochar producing technologies. Biochar policy support.
3. Development of a detailed composting technology /compost product matrix database ranking the available compost production technologies. Compost policy support.
4. Development of microbiological strategy for fungi, bacteria and mycorrhizal fungi used for compost activation and compost nutrient enrichment application.
5. Improvement of the biochar production and treatment process towards high quality standardised 'end-of-waste' quality biochar production and zero emission performance.
6. Composting process optimisation and product improvement for nutrient retention and emission minimisation, including identifying and proposing good operational practices and technological improvements.
7. Best available technology (BAT) demonstrations and trials for improved and sustainable compost and biochar production.
8. Validation of the improved technologies and recycled products against 'end-of-waste' criteria with compost and biochar in field crop trials under different conditions, including environmental feasibility and safety evaluations.
9. Setting up a framework for common quality standard requirements and new application methods for biowaste treatments and compost/biochar products to guarantee a high level of protection of human health and the environment.
10. EU-wide dissemination programme for SME's, farmers and other end-users.

## The REFERTIL consortium

- TERRA HUMANA Clean Technology Development, Engineering and Manufacturing Ltd., Hungary ([www.agrocarbon.com](http://www.agrocarbon.com))
- Stichting Dienst Landbouwkundig Onderzoek (DLO), Netherlands ([www.pri.wur.nl](http://www.pri.wur.nl))
- Aarhus University, Denmark ([www.au.dk](http://www.au.dk))
- Knowledge Center for Agriculture, Denmark ([www.vfl.dk](http://www.vfl.dk))
- University of Torino - Agroinnova, Italy ([www.agroinnova.unito.it](http://www.agroinnova.unito.it))
- Gottfried Wilhelm Leibniz Universitaet Hannover, Germany ([www.uni-hannover.de](http://www.uni-hannover.de))
- Biomasa del Guadalquivir S.A, Spain ([www.bpeninsular.com](http://www.bpeninsular.com))
- WESSLING Hungary Kft., Hungary ([www.wessling.hu](http://www.wessling.hu))
- KOTO proizvodno in trgovsko podjetje, d.o.o., Slovenia ([www.koto.si](http://www.koto.si))
- Comune di Grugliasco (Municipality, Torino), Italy ([www.comune.grugliasco.to.it](http://www.comune.grugliasco.to.it))
- Renetech Bioresources Ltd., Ireland ([www.renetech.net](http://www.renetech.net))
- Profikomp Environmental Technology Plc., Hungary ([www.profikomp.hu](http://www.profikomp.hu))

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Disclaimer - The views and opinions expressed are purely those of the writers and may not in any circumstances be regarded as stating an official position of the European Commission.



REFERTIL compost product



REFERTIL field trial programme



Compost and biochar quality control