COMPOST and BIOCHAR EU28 standardization for low carbon economy and reducing mineral fertilisers/chemicals use in agriculture.

Edward Someus (coordinator and key technology designer)

biochar@3ragrocarbon.com
The REFERTIL partnership is bringing experts, researchers and SMEs industrial partners from a variety of sectors together with local stakeholders.

<table>
<thead>
<tr>
<th>Participant organization</th>
<th>Country</th>
<th>Activity</th>
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<tr>
<td>TERRA HUMANA Kft. - Coordinator &amp; biochar key tech RTD + designer</td>
<td>HU</td>
<td>Company</td>
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<tr>
<td>Plant Research International, Wageningen</td>
<td>NL</td>
<td>RES</td>
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<td>Aarhus University</td>
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<td>University</td>
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<td>Advisory Centre</td>
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<td>University</td>
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<td>Gottfried Wilhelm Leibniz Universitaet Hannover</td>
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http://www.refertil.info
The **REFERTIL** project is

- recycling of biowastes into biochar and compost products that reduce the dependence on mined and non-renewable Phosphorus and energy-intensive Nitrogen supply resources,

- contributing to the transformation of the organic bio-waste streams from Europe’s agriculture and food industries,

- contributing to the international standardization of compost/biochar products, and

- providing strong policy support to the European Commission Enterprise and Industry DG + other DG’s for regulation of compost and biochar products under the NEW FERTILIZER REGULATION and EU28 law harmonization.

http://www.agrocarbon.com
THE REFERTIL ACTIVITIES: markets, products and policies

Active Policy Support for EC Enterprise and Industry DG.

Biochar produced by modern zero emission pyrolysis process
THE REFERTIL OBJECTIVES

- IMPROVEMENT of the currently used composting treatment and biochar production processes (technical and cost) efficiency and (environmental and human health) safety, with SME user specific and practical field method results.

- Objective driven zero emission processing goal of compost and biochar productions and maximised efficient recovery of nutrients, such as phosphorous and nitrogen.

- Technical-economical-environmental evaluation of 7 biochar processing technologies and 15 compost treatment technologies.

- IMPROVEMENT of the quality and safety of the final products (compost and bio-char application value and results from the field) with established common quality standards for EU28 applications.

Low Carbon Economy: economical development by ecological restoration
Measurable and verifiable REFERTIL performance

The REFERTIL is applied science & technology knowledge generation for environment & market based economical developments and EU28 EC/MS law harmonization support in the field of improved & safe organic waste management.

- All EU available and economically important **bio-waste feed materials characterization >200 million t/y in EU28**.
- **BAT technical-economical-enviro evaluation of 7 biochar processing technologies and 15 compost treatment technologies.**
- **2000 tons** input bio-waste treatment from which 600 tons different types of high quality compost production.
- **100 m3** of different types of biochar production from different inputs.
- **3 economically important food crop plant growth field tests** from year two in 6 counties.

Applied science to achieve knowledge based industrial results
THE REFERTIL BENEFITS FOR EUROPE

- Improving technical, field economical and environmental efficiency of the bio-waste processing and nutrient recycling by advanced and integrated biochar and composting technologies.
- Increasing the competitiveness of agricultural and bio-waste management industries.
- Ecosafe organic products for affordable market price.
- Biochar/compost products for SME farmer EU28 applications.
- Establish clean understanding for all stakeholders, especially SME’s and farmers, possibly differentiated for different European climatic and economic area considerations.
- New and progressive opportunities reached by improved and novel biochar activated composts, which is safer, better, faster and more economical.
- Establish enhanced common quality standard requirements for bio-waste treatment, compost and bio-char quality and trading requirements.
- The valorisation of organic waste and converting it into safe biochar/compost products is a profitable new industrial sector that creates new jobs even in economically difficult times.

Conversion of European knowledge into economical development
REFERTIL POLICY SUPPORT - THE MAIN CHALLENGES

- Minimizing or substitution of agro chemical and chemosynthetic inputs in safe food crop production.

- Ensuring an EQUIVALENT PROTECTION of the ENVIRONMENT, PLANT AND HUMAN HEALTH throughout the EU with harmonised system of controls covering all fertilising materials including mineral fertilisers, organic fertilisers and soil improvers.

- GUARANTEE to farmers fair information and reliability about the minimal nutrient content.

- INTRODUCE more detailed environmental and human health safety requirements.

- Establishing ESSENTIAL SAFETY and AGRONOMIC EFFICIENCY REQUIREMENTS.
SAFETY ISSUE

CURRENT LEGAL SITUATION: Article 14(c) of current Fertilisers Reg. (EC) No 2003/2003: “A type of fertiliser may only be included in Annex 1 if: […] (c) under normal conditions of use it does not adversely affect human, animal, or plant health, or the environment” but it does not include a detailed methodology on how to address these risks.

FURTHER REVISION IS NEEDED:
- to introduce more detailed environmental safety requirements for biochar products.

PROBLEMS & CHALLENGES:
- The term ‘safety requirements’ is neither defined in the EU legislation nor is a common understanding in place.
- ABSENCE of an accepted risk assessment methodology on biochar products.
- Complexity of the biochar safety and a lack of common understanding of what safety assessments should include.

Improving food safety and human health preventive protection
BASIC LEGAL SITUATION – need for policy support


2. **NATIONAL PROVISIONS** for marketing of FM = ‘national fertilisers’.

   - **ABSENCE** of a harmonized system for all FM.
   - The **Fertilisers Regulation** does not affect the ‘national fertilisers’.
   - **MS SPECIFIC Legislations → Large differences**
   - **PRODUCERS CAN CHOOSE:** ‘EC fertilisers’ OR ‘national fertilisers’.
   - **MUTUAL RECOGNITION** (Reg. (EC) No 764/2008) for intra-community movement of national registered fertilisers.
   - **National MS LEGISLATIONS ARE NOT IDENTICAL** throughout the EU27 → **POTENTIAL BARRIERS** to mutual recognition.

Coherently integrated EU and MS fertilizer regulations
1. BASELINE SCENARIO **(NO POLICY CHANGE)** – national legislation coexists with the EU legislation. – not suitable for compost and biochar regulation

2. **REPEAL** of the existing 2003/2003 Reg. reliance on other existing EU and national legislation. - not suitable for compost and biochar regulation

3. **VOLUNTARY COMMITMENT BY INDUSTRY** in addition to existing legislative framework. - not suitable for compost and biochar regulation


5. **FULL HARMONISATION** for all FM – AUTHORISED LIST OF INGREDIENTS AND ADDITIVES. – made for chemical industry and not suitable for bio-substances with substantial variations.

6. **FULL HARMONISATION** for all FM – NEW APPROACH, SAFETY REQUIREMENTS: Human and animal safety, respect of the environment, AGRONOMIC CRITERIA – best suitable for biochar and compost adaptation and safe regulation

7. **COMBINATION of 1-6.** - over-complex

Flexible consideration for EC and MS policy options
REFERTIL related EU legislations

- **REACH** Regulation (EC) No 1907/2006;
- Eco-label for growing media and soil improvers - Regulation (EC) No 66/2010;
- **POPs Regulation (EC) No 850/2004**;
- Regulation (EC) No. 1881/2006 setting maximum levels for certain contaminants in foodstuffs;
- Directive 2000/29/EC on plant health;
- Landfill Directive 99/31/EC;
- Industrial Emission Directive (IED 2010/75/EU)

Complex EC regulations for improved food and human health safety
Based on the REFERTIL results distinction should be made between bone biochar and plant biochar:

**Plant biochar:**
- >90% w/w high carbon content plant origin
- micro and meso porous (1 nm – 50 nm) carboniferous product,
- high water holding and nutrient retention capacity and C sequestration,
- no soil fertilization effects. Can be recognised as soil improver? **YES**

**ABC: Animal Bone bioChar NPK-C ORGANIC FERTILIZER**
- The input animal bone meal is food grade category 3 rendering by-product with economical importance, produced in large industrial scale (2-3 million t/y) which concentrated high P content apatite is an critically and strategically important inside EU natural and RENEWABLE RESOURCE.
- <20% w/w low carbon and high calcium phosphate/ apatite mineral content
- macro porous (50 nm – 63k nm)
- Containing significant amount of MINERAL nutrients.
- Can be recognised as organic fertiliser? **YES**

Advanced BIOCHAR strategy with alternative solutions
If the land needs 61.5 kg P$_2$O$_5$/ha

<table>
<thead>
<tr>
<th>Biochar</th>
<th>Amount (kg/ha)</th>
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<tbody>
<tr>
<td>ABC-bc/7</td>
<td>211</td>
</tr>
<tr>
<td>ABC-bc/10</td>
<td>202</td>
</tr>
<tr>
<td>G-bc/1</td>
<td>32 430</td>
</tr>
<tr>
<td>G-bc/2</td>
<td>16 783</td>
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<tr>
<td>Dk-bc/1</td>
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<tr>
<td>Fertiplus-bc</td>
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<td>Fr-bc/1</td>
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<tr>
<td>Fr-bc/2</td>
<td>63 181</td>
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<tr>
<td>It-bc/1</td>
<td>98 359</td>
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<tr>
<td>UK-bc/1</td>
<td>86 900</td>
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**CONCLUSIONS:**
1. **ABC** is full value organic P fertilizer, NPK-C.
2. **Plant based biochar** having direct fertilizer value only at extreme high doses. Dose: =5 t/ha but <20 t/ha.
3. Enduser farmer point of view **ECONOMY** is a key driver.
SAFETY REQUIREMENTS for COMPOST AND BIOCHAR

PRODUCT SAFETY EVALUATION: determination of the potential key contaminants having negative effects on the human, plant health and the environment.

Accredited analysis in Wessling laboratory:
- >25 different compost products from 6 countries
- 18 different biochar products from 7 countries.

MAIN CRITERIONS:
- Criterion 1: HEAVY METALS
  - Minimum indicators: Cd, Ni, CrVI, Cr total, Hg, Pb, As + Cu, Zn (manure !) and Se
- Criterion 2: ORGANIC POLLUTANTS
  - Minimum indicators: PAHs, PCBs, PCDD, PCDF
- Criterion 3: MICROBIOLOGICAL PARAMETERS
  - Minimum indicators: Salmonella spp, E. coli.

Environmental and human safety prime objective
THANK YOU!

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