

REFERTIL BioChar

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Project acronym: REFERTIL

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

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REFERTIL BIOCHAR PRODUCT EU STANDARDISATION PROPOSAL

The REFERTIL consortium is led by and specialized international science and senior engineering group for biochar science – technology – industrial engineering – legal – Authority permitting - industrial production and user oriented commercial application knowledge center with comprehensive operational fields from laboratory into full industrial scale demonstrated commercial biochar manufacturing and applications (www.refertil.info).

Rationale for limit values and quality criteria of the biochar products made from biomass by-products:

1. **SAFETY:** There should be no overall adverse environmental, ecological and human health impact from the use of biochar products in the open soil environment.
 - a. Refertil BioChar measures: clear and strict definition of the biochar product quality and integrated interconnection of the new EU/MS industrial, agricultural and environmental regulations, including Authority permits for manufacturing, importing, supply and use of biochar over 1 t/y capacity. By application and follow up these EU/MS regulation for the Refertil BioChar biochar case, the environmental risks coming from misuse of biochar products are removed.
 - b. The limit values set for PAHs, PTEs and pollutants with biochar quality criteria should promote the production of higher quality and safe biochar products under reasonable economical conditions.
 - c. Biochar made from waste material streams under WfD/EoW criteria, is proposed to be separately mandatory law harmonized by the MS.
2. **MARKET REGULATION:** The limits and biochar quality standards should exclude the poor quality biochar products from the market, those are usually missing the environmental and human health measures during its obsolete charcoal production schedules. Biochar products made from biomass by-products and regulated under mandatory EU Regulations are proposed to be mutually MS recognized products, while biochar made from waste material streams under WfD/EoW criteria, is proposed to be separately mandatory law harmonized by the MS.
3. **AUTHORITY CONTROL:** beyond the availability of the Authority permits for production and use biochar over 1 t/y capacity, the Authority control and continuous follow is important element. By selection of **key performance indicators** full and transparent up to date information on biochar production and product quality.
 - a. **N-P-K nutrient content indicator:** Minimum nutrient content key indicator.
 - b. **PAHs:** Target pollutants. Product and environmental quality key indicator.
 - c. **TEOC:** Total Extractable Organic Compounds **Marker Index** and biochar production performance key indicator.
 - d. **Potential Toxic Elements (PTEs):** target pollutants key indicator.
 - e. **PCB₇:** Contamination indicator also for PCDD/F.

Other measurement protocols are as of the ECBC list.

Notice: all these measurements are of low laboratory costs, easy available and affordable in any EU28 by any professional and responsible biochar producer and supplier, and makes the full biochar supply chain fully documented and public transparent for Authorities, officials, Consumers and all other stakeholders.

4. **BIOCHAR PRODUCTION:** The Refertil BioChar quality criteria for biochar product, application and follow up of the new EU/MS industrial, agricultural and environmental regulations encourage the best practice of biochar production and supply of safe biochar. The Refertil BioChar criteria

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also providing a legal, technical, economical and market platform for sustainable biochar business operations, including an important legal element to support the users and consumers interest, such as producer's biochar product responsibility, insurance and guarantee, same way as for any other commercial products.

5. **ECONOMY:** The ECBC provides rational, realistic and commercial market demanded economical scenario for all biochar stakeholders from feed material supply, through production and user application, while the environment and climate protection is also on the win side.

GENERAL	REFERTIL BioChar
Ref. web	http://www.refertil.info
Date	2013_ v3.0
Area	EU
Developer	REFERTIL EU FP7 Consortium Developed by: Edward Someus biochar science and technology senior engineer, P1-TERRA and P9-WESSLING Contributors: P3-AU, P4-VFL, P5-AGROINNOVA, P6-LUH, P11 KOTO
Status	Statutory if EC accept the inclusion of biochar as fertilizer or additive in the new revised Fertiliser Regulation. Current status: policy support.
Aims/Goals	EU policy support for the European Commission (DG Industry & Enterprise) in the revision of the Fertiliser Regulation (Reg. (EC) No 2003/2003), and the possible inclusion of biochar - as organic fertilizer (ABC animal Bone biochar) and soil additive (plant biomass byproduct based biochar).
Gurantee	If EC accept the inclusion of biochar as fertilizer or additive in the new revised Fertiliser Regulation, the Regulation will provide a solid legal guarantee for safe biochar use and fully meet all the interlinked EU/MS regulations.
Biochar definition	Biochar is plant and/or animal biomass by-product based stabile carboniferous substance, that is pyrolysis processed and safe product applied under Authority pemitted legal frameworks. Plant based biochar is a stabile carbon high content plant origin micro and meso porous carboniferous product , with relatively high water holding and nutrient retention capacity and C sequestration, but almost no soil fertilization effects. Plant biochar is produced from plant biomass materials between 450°C – 550°C reductive thermal processing negative pressure conditions with zero emission or near zero mission environmental performance. “ABC” Animal Bone bioChar is a high calciumphosphate apatite mineral and low carbon content macroporous slow release organic fertilizer. ABC is produced from food grade category 3 and 2 bones between 500°C – 650°C reductive thermal processing negative pressure conditions with zero emission or near zero mission environmental performance. ABC is composed principally of carbon and hydroxyapatite the latter being the inorganic constituent of natural bone.
Biochar types / grades	Plant based biochar (PBC) soil improver and ABC (animal bone biochar) organic fertilizer. Strongly recommended that only one grade and mimimum high enough environmental quality biochar type is to be defined.
Biochar feedstock	Requirements: not competing with human food, animal feed and plant nutrition supply, and originating from environmental and climate protection sustainable source and supply.

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**REFERTIL BIOCHAR proposal for soil improver/organic fertiliser
MANDATORY PARAMETERS (mg/kg d.m.)**

Biochar parameters	ORGANIC FERTILISER	SOIL IMPROVER
Cd	1.0	1.0
Cr	100	100
Cu	200	200
Pb	120	120
Hg	0.5	0.5
Ni	50	50
Zn	600	600
PAH₁₆	6	6
PCB₇	0.2	0.2
PCDD/F5 (ng/kg)	20	20
TEOC	500	500
Germination Inhibition assay	no inhibition	no inhibition
Phytotoxicity	no Phytotox.	no Phytotox.
Particle size distribution	ABC: 1 mm-5 mm 90%	Plant based: 1-20 mm90%
Bulk density	declaration	declaration
Dry matter content	> 80%	> 60%
pH	6-10	6-10
Total Organic C	7%	50%
N total	declaration	declaration
Total P (P₂O₅)	>25 %	declaration
Total K	declaration	declaration
Ca	declaration	declaration
Mg	declaration	declaration
Agronomic efficiency	Should be proved and declared	Should be proved and declared
As, Mo, Se	not recommended, data related to As, Mo and Se are needed for products containing feed materials from industrial processes made from waste material under WFD/EoW cases and determined by the MS.	
H/C	not recommended, substituted with TEOC	

In this context different biochar law harmonization levels are proposed:

- 1) **EU level:** Mandatory EU regulation for determination of the biomass by-product based minimum EU biochar standards and mutual recognition schemes of the biochar products.
- 2) **MS/REGIONAL level:**
 - a. MS adaptation of the mandatory biomass by-product based EU regulation or improved MS (region/country/environmental condition specific) mandatory biochar standards.
 - b. MS mandatory determination of the biochar standards made from waste material under WFD/EoW cases.
- 3) **USER information and advisory network:** Voluntary mandate is an agricultural advisory public service network to consult individual biochar producers and users to advise and promote individual projects, biochar product safety, users, applications and provide common language Consumer public information based on a language of each MS.

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