REFERTIL
Converting organic by-products into safe biochar

Recycling and economical reuse of concentrated “ABC” Animal Bone bioChar organic Phosphorous fertilizer natural product in horticulture

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http://www.refertil.info
WHAT IS BIOCHAR?

Biochar is plant and/or animal biomass by-product origin carboniferous material aiming carbon negative multi-functional soil enhancement for eco-safe applications to grow plants.

APPLICATIONS:

1. SOIL IMPROVER
2. GROWING MEDIA
3. ORGANIC PHOSPHOROUS FERTILIZER

All biochar productions and/or applications above 1t/y capacity require mandatory Government Authority permits and REACH registration. The EU Fertilizer Regulation revision is under consideration to include biochar as EU MS mutually recognized product by 2016.
DIFFERENT TYPES OF BIOCHARS CAN BE PRODUCED....

1. **Plant based biochar** (soil improver, growing media)
   - made from plant biomass materials (*agri byproducts*)
   - >90% *stable* C content
   - high water holding and nutrient retention capacity
   - no soil fertilization effects
   - Dose: 3 t/ha – 20 t/ha

2. **“ABC” Animal Bone bioChar** (organic Phosphorous fertiliser, soil improver, growing media)
   - made from food grade category 3 bones
   - 90 % mineral content - 10% C
   - 30 % P2O5 + Ca, Mg, K
   - macro porous material
   - slow release organic fertilizer
   - Dose: 0.2 t/ha – <1 t/ha

Wide range and variety of input feed material options
HOW BIOCHAR IS MADE?

- **BIOCHAR PROCESSING:** pyrolysis – carbonization process in reductive (indirectly heated) thermal conditions, 450°C - 850°C (usually around 550°C material core).

- **ABC** Animal Bone bioChar processing require by far more higher efficient thermal processing, complex and higher level of technology, - than PBC Plant Based Biochar.

“3R”
- Recycle
- Reuse
- Reduce
- zero emission technology

Advanced pyrolysis technology is required for QTY biochar
If biochar case is not mandatory regulated, than these techniques will be applied.
BIOCHAR PORE STRUCTURES

ABC: macroporous
50 nm – 63,000 nm

Plant based biochar: micro - mesoporous
1-50 nm

Impact on adsorption performance – soil microbiology
Why do we want to avoid directly using Bone Meal in livestock feed and fertilizers?

- ABP Animal By-Products, like MBM, PAP Processed Animal Protein and food grade category 3 animal bone meal, are processed at <133°C, 20 min. 3 bar.

- Despite ABPs are sterile products at the point of production, there is a very high risk for cross and recontamination during storage and applications.

- Renderers take many precautions to prevent recontamination while the ABP is in their possession - but have little or no any control over their product once it leaves a facility. *Salmonella may be present in any feeds/foods and/or by cross / recontamination at such low levels that it is difficult to detect*, but nevertheless it proves to have a high survival and colonization ability after introduced in new in-vivo environment.

- As because animal rendering by-products are mammal protein based, the following *protein nutrition optimized human and animal pathogens* are prime risk potential: *Salmonella, Anthrax, TBC, Mouth and foot disease*.

- In order to guarantee full safety for ABP use under any circumstances and conditions, it must be processed above >550°C material core.

- ABP producers having full upstream and downstream responsibility for animal by-product, including disease cross and recontamination cases as well.

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The safe biochar and compost treatments defined require temperature profiles
ABC total P substitution potential EU28 = <20%
PAH16 OR PAH19 – TARGET CONTAMINANTS IN BIOCHAR

Towards low PTE Potential Toxic Elements + Organic pollutants

Sum of PAH\textsubscript{16} (mg/kg dm, limit value: 6 mg/kg)

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PAH19 < 6 mg/kg $\rightarrow$ 1 mg/kg
Why recycled Phosphorus is strategic important

- Mineral P fertilizers are Cadmium and Uranium contaminated (1 kg Uranium/ha since 1951).
- Reducing mineral fertilizers and chemicals use in agriculture leads to sustainability.
- P import to EU >93%, that need to be reduced.
- Only two options for concentrated >30% P2O5: ABC Animal Bone bioChar and Struvite.
- Long list of technical, safety, legal, environmental and economical benefits to use ABC Animal Bone bioChar.
- Fertilizer Regulation revision (EC 2003/2003) open new options. EU28 law harmonization of agri/food industrial by-product use is on way.

P is critical security and safety issue for food production
THANK YOU!

REFERTIL: science and industrial engineering to achieve results together.

Mr. Edward Someus
Coordinator & key tech engineer

http://www.refertil.info
http://www.3ragrocarbon.com

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