

Characterisation for Commercialisation: What the Consumer, Distributor and Regulator Needs to Know

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The Market for Biochar and Biochar Composites

- 1.Home Gardens
2. Horticulture (vegetables and tree crops)
3. Viticulture
- 4.Turf Industry
- 5.Composter and Biofertiliser Manufacturer
- 6.Intensive pasture
- 7.Intensive livestock (e.g. chicken sheds)
- 8.Mine Site and Contaminated Site Remediation
- 9.Forestry
- 10.Broadacre

Who Needs to Know About the Biochar

1. End Consumer (Homeowner, Farmer, Environmental Scientist, Enterprise Manager)
2. The Distributor
3. The Regulator (EPA, Auditors)

The Producers also need to have assessed the characteristics of their feedstocks and how these feedstocks can be transformed into biochar that is fit for purpose

What Do They Need To Know

- 1.Safe (For Human, Health and Environment)
- 2.Complies with local Standards or Regulations
- 3.Product description which provides fit for purpose data
- 4.Storage and Application Instructions
- 5.Warnings in relation to possible negative impacts
- 6.Feedstock sources (e.g. from urban greenwaste)
- 7.Information on any field trials or independent testing (possibly via web based site)
- 8.Possibly description of the production process and technology

Safety Issues

1. Has no negative impact on soil functions as defined by the proposal for a soil framework directive COM

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a. biomass production, including in agriculture and forestry

b. storing, filtering and transforming nutrients, substances and water □ biodiversity pool, such as habitats, species and genes, □ physical and cultural environment for humans and human activities □ source of raw materials □ acting as carbon pool □ archive of geological and archeological heritage

2. Does not catch fire or cause dust explosions if contained as per manufacturers recommendations.

Standards and Regulations

Example

1. Biosolids Guidelines
2. Biomass and Waste Management Sustainability Guidelines
3. Potting Mix Standard
4. Compost Standard
5. Fertiliser Standards

<i>Contaminant acceptance threshold NSW EPA230800d (EPA compost guidelines 2009)</i>		
<i>Contaminant</i>	<i>Grade A mg/kg total</i>	<i>Grade B mg/kg total</i>
<i>As</i>	<i>20</i>	<i>20</i>
<i>Cd</i>	<i>3</i>	<i>5</i>
<i>Cr</i>	<i>100</i>	<i>250</i>
<i>Cu</i>	<i>100</i>	<i>375</i>
<i>Pb</i>	<i>150</i>	<i>150</i>
<i>Hg</i>	<i>1</i>	<i>4</i>
<i>Ni</i>	<i>60</i>	<i>125</i>
<i>S</i>	<i>5</i>	<i>8</i>
<i>Zn</i>	<i>200</i>	<i>700</i>

These are thresholds for compost made from Biosolids

Product Description for Most Purchasers

1. Nutrient Content (available vs total)
2. Organic Carbon Content (Stable Carbon?)
3. pH and liming value
4. Water Holding Capacity (or Plant Water Availability) and Wetability
5. EC
6. Physical Properties (bulk density, weight and possibly average particle size)

Draft Code of Practice for Fertilizer Description and Labeling FIFA (2010)

Nutrient	Minimum (%)
N, P, K, S, Ca, Mg, Si	.5
Fe	.1
Cu, Mn, Zn	.05
B	.02
Mo, Co, Se	.001

Other information recommended by Fertilizer Federation of Australia (FIFA) include tolerances on nutrient concentration, forms of nutrients (e.g. N as nitrates)

FIFA Fantastica Complete + (16-5-12-6)

Nitrogen	
Nitrate	7.8%
Ammonium	7.8%
Total Nitrogen	15.6%
Phosphorus	
Water Soluble	4.0%
Citrate Soluble	1.0%
Citrate Insoluble	0.1%
Total P	5.1%
Potassium as sulphate	11.9%
Sulphur as sulphate	6.5%
Calcium as phosphate	3.7%
Zinc as oxide	2.1%

Impurities	
Fluorine (maximum)	0.75% : 145g F/kg P
Cadmium (maximum)	5 mg/kg : 70mg Cd/kg P
Lead (maximum)	20mg/kg
Mercury (maximum)	0.6mg/kg

!! Warning Statements !!

Do not swallow. The dust from this product may act as an irritant. Avoid inhalation and contact with the eyes and skin.

This product contains fluorine as an impurity. Do not feed this product to livestock or use in stock feed mixtures. If top dressing pastures do not graze for 3 weeks or until rain or irrigation is received.

This product contains heavy metal impurities. Its use may result in accumulation of lead and mercury in the soil and may lead to residue levels in plant and animal products in excess of the maximum level specified by the Australia New Zealand Food Standards Code.

Manufactured by:

FIFA

Level 2, 1 Hobart Place

3000 000 000

Storage and Application

1. Where and how to store.
 2. Lifetime of Storage
 3. Fire protection requirements for storage and application
 4. Application rates; when, where how deep to apply
1. Suggestions on how to apply and on what soils with examples

Warnings

For Plants/ Trees

1. Temporary Drawdown
2. Initial Salting Effects
3. If applied dry to surface potential dust issues with high winds

For Humans

1. Do not swallow.
2. The dust from this product may act as an irritant or could be toxic. Avoid inhalation .
3. Contact with the eyes and skin

Suggested Test Methods

Basic

1. Ecotoxicity

- Earthworm (Acute and Avoided)
- Germination Inhibition Assay

2. Agronomic (pH, liming effect, N, P, K, micronutrients, EC, organic and total carbon)

3. Dissolution Test

4. Absorptivity

5. Total Metals and Crystalline (Silica)

Suggested Test Methods

Other Special Needs Test

1. Simulated biogeochemical weathering with/without soil (Yao et al., 2010),
2. Changes in soil redox following biochar addition
3. Tests to determine the concentration of functional groups and surface charge, CEC, Boehm Titration (with suitable protocol for salts), FTIR
4. Surface area, pore volume and pore size distribution
5. Concentration of different labile plant & microbe effective compounds
6. Carbon Stability (agreed test procedure)

Questions?