Benefits of Adding Biochar to the Composting Process

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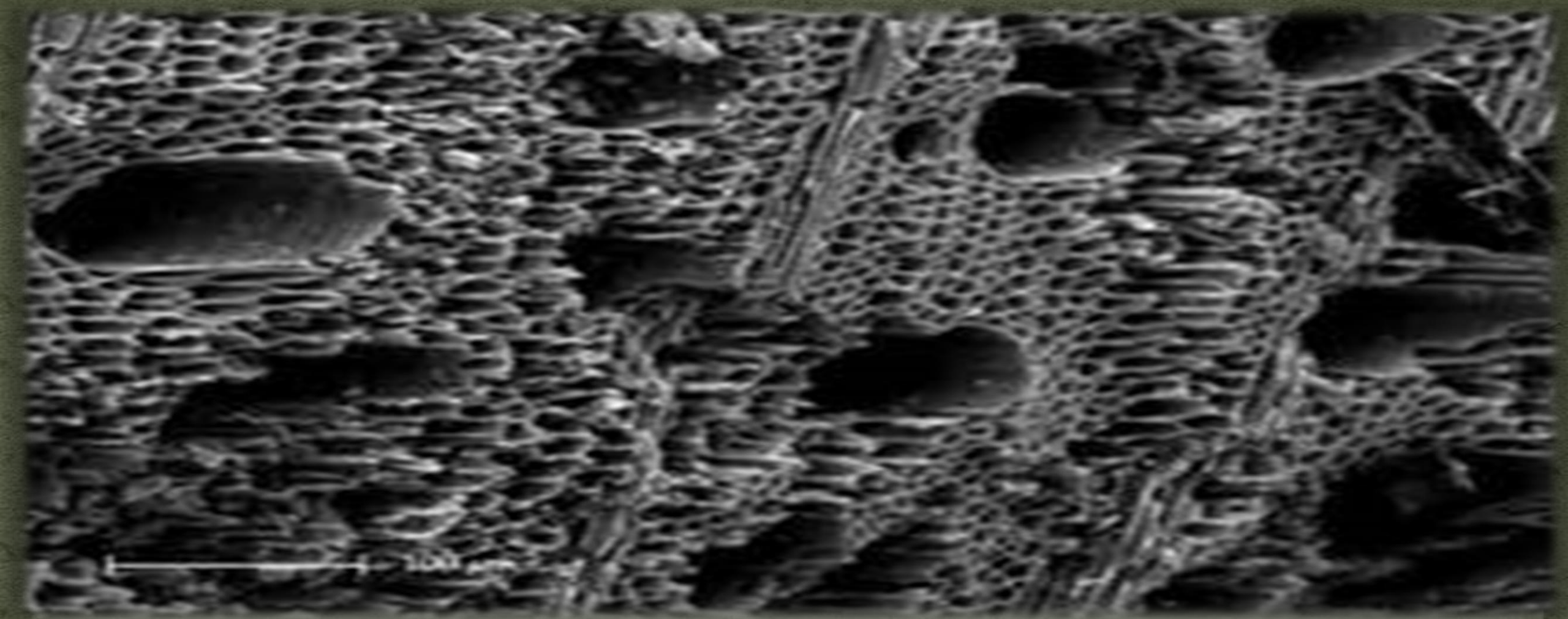
Why Add Biochar to Compost?

- It speeds up the Composting Process
- It will improve the Characteristics of the Compost

What is Biochar

- How is it Made
- Different Characteristics
- Benefits
- Uses



Biochar is produced by pyrolysis where biomass is heated with little or no oxygen. Liquid and gasses are removed and a high carbon shell remains

Biochar can be made from a variety of Feedstocks

- Bamboo
- Straw
- Rice Hulls
- Manure
- Wood or Woody Biomass-Typically this material has low moister and good structure characteristics

- Like Compost Different Feedstocks Produce
- Different Biochar Characteristics

- Like Compost Different Characteristics of Biochar Equal Different Functions or Uses

Different Feedstocks Will Yield Different Biochar Characteristics

- Carbon Content
- Ash Content
- pH
- Minerals
- Bulk Density

Activation of Biochar

Raw Biochar is Like a Sponge

- For Most Soil Uses Biochar Benefits Are Enhanced With Some Form of Activation -"Oxidative Ageing" or "Weathering"
- Biological and/or Mineral Additions

We decided to do some research to evaluate the benefit of adding biochar to the composting process

We started with two 75 cubic yard piles of green waste feedstock

The material placed on an ASP for two weeks to meet PFRP

One pile we added 5% by volume of biochar

The other pile as a control

We adjusted both piles to 50% moisture

- The biochar had a 75% carbon content and a pH of 9.5
- We monitored the temperature every two weeks.
- The piles were not turned for 12 weeks

At 2 weeks

The pile with biochar

- 123 degrees F

The control pile

- 135 degrees F

At 4 weeks

- The pile with biochar
- 142 degrees F
- The control
- 140 degrees F

At 8 weeks

The biochar pile

147 degrees F

- The control
- 140 degrees F

At 12 weeks

The pile with biochar

- 138 degrees F

The control

- 130 degrees F

At 12 weeks we sent samples of the piles to Microbial Matrix Systems in Albany OR

We wanted to **determine** if there were any biological differences in the compost

Bacteria and Fungi Ratios and Percentages

	Percent Actvie Bacteria	Percent Active Fungi	
Desired Range	**(5 - 20%)**	**(5 - 20%)**	
4000 12wk Greenwaste	0.47%	0.0%	
	Low	*Okay*	*As compost cures or ages it is important to have Percent Active Bacteria and Percent Active Fungi within desired ranges. This is an indication of biological maturity. In turn biological maturity can improve the potential for better utilization of plant needed nutrients.*
4001 12wk Greenwaste with 5%Biochar	5.2%	6.3%	
	Optimum	*Optimum*	*The Biochar Greenwaste compost is much more biologically mature than Greenwaste compost alone.*

The Primary and Secondary Nutrients

Compost w/biochar

Nitrogen 1.1
Ammonia 22
Phosphorus .43
Potassium .71
Moister 53.8
CEC 78.6

- Control

- Nitrogen 1
- Ammonia 280
- Phosphorus .34
- Potassium .60
- Moister 51.1
- CEC 66.8

Observations of Results

- Better Moister Retention
- Better Nutrient Retention (Less Emissions?)
- Better CEC
- More Mature Compost In Less Time

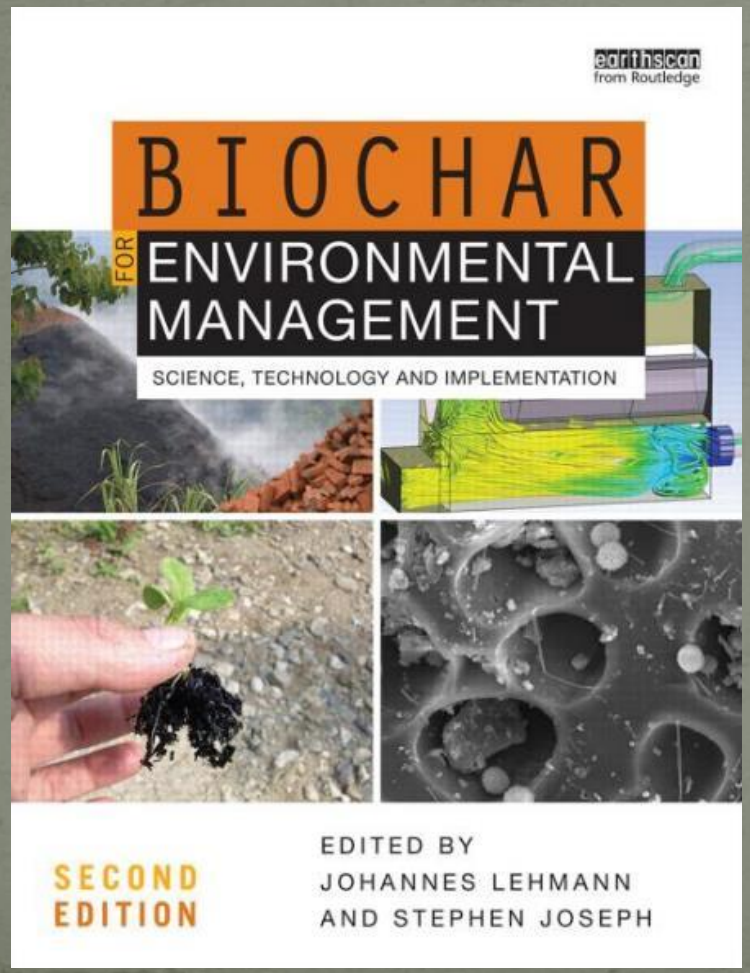
- Less Management of Composting Process To Have Better Quality Compost

Is There Other Research to Substantiate Our Findings?

- YES

- Lots of Research and Finding Similar Results in the EU.

Biochar as an additive to the composting process



- Physiochemical Changes
- Biological Changes

Research on Adding Biochar to Compost

Role of biochar as an additive in organic waste composting

https://authors.elsevier.com/a/1WBAf3QUFZ10j2

- ·Miguel Sanchez-Monedero

Findings:

- •Biochar enhances environmental conditions for microbial growth in composting piles.
- ·Key biochar properties include porosity, surface area and cation exchange capacity.
- Biochar application at 10% is recommended for optimum composting performance.

- Biochar at 10–30% rates succeeded in mitigating NH_3, N_2O and CH_4 emissions. (Ammonia-Nitrous Oxide-Methane)

- Biochar decreased bioavailability of Cu and Zn in composts

This paper has over 97 references

Thank You