

## **Preconference Workshop Introduction to Biochar**

### **Summary:**

The science and practice of composting with biochar will be presented by four scientist from the USDA Coastal Plains Research Center in Florence, South Carolina, and two commercial producers of biochar enhanced compost products from North Carolina and California. The scientists will describe methods of creating and characterizing biochar with enhanced capabilities using different thermochemical and biological technologies, how “designer biochars” can be created to address particular crop and soil conditions, soil carbon, effect of biochar blends on soil microbial communities and composting biochar with worms. Commercial suppliers will discuss some fo the challenges involved in creating specialized compost / Biochar blends, how Biochar enhances compost quality, benefits of composting with Biochar to boost effectiveness, and best management practices to optimize product quality. They will provide an overview of the new market opportunities for biochar enhanced compost.

### **Instructors:**

Introduction: Tom Miles, USBI

Biochar 101: Dr. Jeff Novak, USDA Agricultural Research Service, Florence, SC.

Dr. Kyoung Ro is a Research Environmental Engineer with the USDA-ARS-Coastal Plains Research Center.

Dr. Gilbert Sigua is Research Soil Scientists with the USDA-ARS-Coastal Plains Research Center.

Dr. Tom Ducey is a Research Microbiologist with the USDA-ARS-Coastal Plains Research Center.

Commercial Experience with Biochar and Co-composting:

Jon Nilsson Chargrow, Mills River, NC

Peter Hirst Symsoil, Santa Rosa, CA

**Time:** 1:00 PM to 4:30 PM

**Fee:** \$205 for USCC members, \$255 for nonmembers

**CCOM™/CCP™ PDHs:** 3.5

### **Agenda:**

**1:00-1:10 Introduction:** Introduction to the workshop with brief overview of the production and use of biochar for blends with compost and co-composted products.

**1:10-2:10 Biochar 101:** Creating and characterizing biochar with enhanced capabilities using different thermochemical and biological technologies

Novak-Biochars are used as amendments to increase soil fertility, improves soil physical conditions, and sequester nutrients/heavy metals in environmental restoration projects. Biochars ability to express these diverse functions is explained by production conditions involving feedstock selection, pyrolysis settings, and post production handling activity. In this Biochar 101 presentation, we will explore how production management decisions shapes biochar characteristics and hence affects their multi-functional responses (i.e., nutrient cycling and microbial responses, etc.).

Sigua-Biochars/compost mixtures are currently being evaluated as soil amendments for their impact on soil carbon and nitrogen cycling, corn grain yield and biomass production. Results will be presented that details amendments implication on soil C contents, carbon dioxide emission and corn nutrient uptake responses.

Ducey-We will discuss research into understanding the effect that biochar/compost blends have on soil microbial communities and their functions. Utilization of biochar and compost as soil amendments have both been demonstrated to have a synergistic effect when combined. Increases in microbial diversity, enzymatic activity, and plant biomass have all been documented.

Ro – Biochar with enhanced surface functionalities and capabilities can be created by using hydrothermal carbonization (HTC) technology or composting biochar and earthworms in tandem. Brief description of these methods and some of key advantages of using hydrochar (produced from HTC) or vermichar (produced from vermicomposting biochar) for environmental and soil applications will be presented at the meeting.

#### **2:20-4:30 Commercial Experience with Biochar and Co-composting:**

Nilsson and Hirst - In the second section of the workshop we will provide a scientific and practical analysis of some of the challenges involved in creating specialized compost / Biochar blends. We will cover: 1) how Biochar enhances compost quality, 2) the benefits of composting with Biochar to boost effectiveness, and 3) best management practices to optimize product quality (including: materials handling, odor control, C:N ratio, moisture, and fungal/bacterial balance). The final segment will provide an overview of the new market opportunities that have come on line over the last few years.

#### **About the instructors**

**Tom Miles** is a biomass energy engineering consultant from Portland, Oregon. With more than 40 years in the design and development of systems for conversion of industrial and urban wood residues, and agricultural residues including crop straws and manures, he finds biochars to be useful for nutrient and residue management. He chairs the International Biochar Initiative and the U.S. Biochar Initiative.

**Dr. Jeff Novak** is a Research Soil Scientists with the USDA-ARS-Coastal Plains Research Center in Florence, SC. Since 2007, he has conducted multiple research projects involving biochar's ability to improve soil fertility, soil carbon sequestration and physical conditions in Coastal Plain agricultural soils.

Most recently, Dr. Novak is leading three projects with EPA and ARS colleagues to design biochars with attuned properties that favors heavy metal sequestration at two Superfund sites and phosphorus abatement in Delmarva agriculture soils.

**Dr. Kyoung Ro** is a Research Environmental Engineer with the USDA-ARS-Coastal Plains Research Center. He has conducted numerous research projects involving innovative agro-environmental-energy-soil applications of biochar and hydrochar. Currently, he is investigating the potential of composting earthworms and biochar together to enhance biochar's enzymatic activities.




**Dr. Gilbert Sigua** is Research Soil Scientists with the USDA-ARS-Coastal Plains Research Center. He has established that certain plant-based biochars can enhance soil properties that improves grain sorghum yields. More recently, he is establishing how corn grown in biochar/compost treated sandy soil is influencing soil carbon and nitrogen cycling.

**Dr. Tom Ducey** is a Research Microbiologist with the USDA-ARS-Coastal Plains Research Center. He has extensively studies soil microbial community structural relations and enzymatic activity in sandy soil treated with different biochar/compost mixtures. He is currently leading the Centers research efforts on soil health responses due to tillage operations and cover crop rotations in sandy soil.

**Jon Nilsson**, Soil Scientist, Ecologist and Product Developer - CharGrow USA

Managing partner of biochar products manufacturing and sales operations in North Carolina. In consulting work provide advise in all phases of product development, packaging, marketing and technical support for end users. Extensive experience in production and use of carbon based bioinoculants for ag and horticultural applications. Focused on products that reduce production costs and improve plant performance by increasing water and nutrient use efficiency. 25+ years experience providing advisory services to government and private sector companies on compost production and other bio-based products for agriculture, golf, sport turf, and other applications.

**Peter Hirst** is a founder and principal of Symsoil Inc, where he develops biochar co-composting products and methods. Peter has specialized in biochar for over 10 years, developing production technology and writing and presenting extensively. An experienced educator, he has conducted courses and workshops in Conservation Burns, farm-scale production technology, integrated organic systems and incorporation of biochar in permaculture design. He most recently presented on co-composting at scale at the USBI National Conference on Biochar and Bioenergy at Colorado State University. He is a principal author of The Biochar Revolution, and is working on his second book, on agricultural biochar applications.

			
<p>John Nilsson, Chargrow</p>	<p>Peter Hirst, Symsoil</p>	<p>Tom Miles, USBI</p>	
			
<p>Jeff Novak, USDA ARS</p>	<p>Gilbert Sigua, USDA ARS</p>	<p>Kyoung Ro, USDA ARS</p>	<p>Tom Ducey, USDA ARS</p>