

2014 Hangzhou Biochar Workshop

Evaluation of Current Biochar Research and Its Future

Hangzhou, China, October 2014

The workshop held in Hangzhou, China, from Oct 12th to Oct 14th, 2014, was organized by Zhejiang University, China Agricultural University and Zhejiang A&F University. This is also the 4th China biochar workshop under China Biochar Network (CBN). This workshop aims at: 1) an overview of what is known and what is not known for current biochar research, and 2) an interactive discussion for participants to exchange ideas and experiences on research areas and grants application within China and worldwide.

There were about 40 scientists attending the 4th China biochar workshop. The participants from academic sectors came mainly from UK, China, Italy, Australia, New Zealand, Hongkong, Ireland, etc., including Saran Sohi (University of Edinburgh and IBI board member), Qimei Lin (China Agricultural University), Maria De Nobili (University of Udine), Xinde Cao (Shanghai Jiaotong University), Stephen Joseph (The University of New South Wales), Philip C. Brookes (Zhejiang University), Zubin Xie (Institute of Soil Science, China Academy of Sciences), etc.

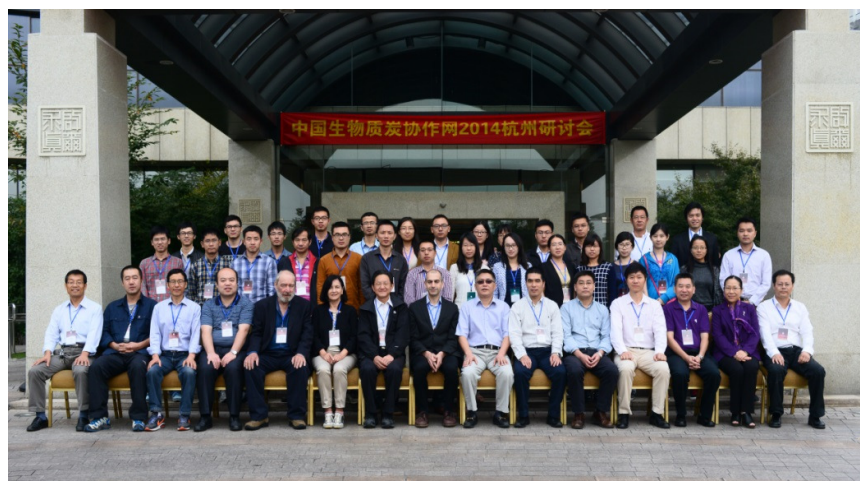


Photo: Attendees in the conference

Opening ceremony was addressed by the Deputy Dean of the College of Environmental & Resource Sciences of Zhejiang University. The conference contained four sessions: 1) Agronomic benefits and soil process; 2) Carbon sequestration; 3) Restoration of function in degraded land; 4) Remediation of contaminated soil. Details are displayed below.



Photo: Attendees giving lecture.

1) Agronomic benefits and soil process

Biochar has some advantages such as high nutrients, benefit plant yields, increasing soil CEC, however, barriers still exist. For further research, Prof. Saran Sohi suggested scientists should select biochar purposefully, so that the specific biochar can be designed to realize maximum functions with least cost. Prof. Weixiang Wu presented their results that rice straw derived biochar is a promising functional material together with nitrogen fertilizers in the aspect of increasing rice productivity by microbial metabolism.

2) Carbon sequestration

Reducing greenhouse gases and increasing soil carbon sequestration have become the focus since research on biochar started. Prof. Jianming Xue linked the increased activity of mycorrhizal fungi and carbon sequestration, he thought biochar made effects on biodiversity of forest soil ecosystems, e.g., fungi. Moreover, biochar addition maximizes the GHG mitigation effects in forests. Prof. Zhubing Xie indicated that, as a potential soil addition, biochar could reduce GHGs

for more than 50% compared with straw amendment. However, Dr. Yu Luo identified that biochar can cause soil priming effects, which might be of some significance in terms of losses of primed C and global emissions of CO₂ from soil. Further investigation may be focused on the direction of the caused priming CO₂ and the mechanisms of SOC respond in different soils (soil and biochar rich soil) while added with organic matter.

3) Restoration of function in degraded land

Farmland degradation is serious in China. In terms of soil restoration, enhanced effectiveness and reduced nutrients leaching are necessary for keeping soil healthy. Dr. Zhongming Dai mentioned that biochar increased and maintained soil pH for long periods, and its effects are determined by the alkalinity of biochar and N nitrification in soils. The incorporation of biochar may increase N nitrification and change the soil acidity in higher pH soils. Dr. Yue Yang pointed that biochar also can influence soil salt leaching in saline soil.

4) Remediation of contaminated soil

Since the activity and toxicity of heavy metals to plants in acidic variable charge soils are high, it is urgent to find an effective product for soil remediation. Dr Jun Jiang considered the incorporation of biochars increased the adsorption and immobilization of heavy metals in acidic variable-charge soils and thus decreased the activity and availability of the metals. Although biochars have some positive effects on the remediation of heavy metal polluted soils, risks exist actually. Prof. Stephen Joseph's speech made participants re-thinking of the importance of keeping balance between soil remediation and economic feasibility.

In the end, Prof. Jianming Xu, Chairman of this workshop, Prof. Qimei Lin from China Agricultural University, Dr. Saran Sohi from University of Edinburgh gave a brief closing speech of this conference. The conference made success with every member's effort, and mostly made agreement that biochar, as a new amendment in soil, takes positive roles in different aspects, including promoting nutrients transformation, keeping crop quality, helping carbon sequestration, degraded land restoration and contaminated soil remediation. However, still need bear in mind that biochar has some risks and challenges in technique when used as an additive in soils. Thus, we should focus on the specific function of biochar from specific raw material, so that biochar can be selected more purposefully. The economic problems should also be considered in terms of biochar in agronomic benefits or remediation of contaminated soils. In addition, further study should

discuss scale, supply chains, products standards and markets.

There was a tea tour after workshop in the third day's afternoon, through which participants had free talk to exchange ideas while enjoyed Longjing tea and great sunshine.



Photo: Tea talk after workshop

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Presentation list

Name	Organization	Nation	Topic
Maria	University of Udine	Italy	A comparison of biochar, biosolids and a biogas production in the remediation of degraded soils.
Saran Sohi	Edinburgh University	UK	Ten years on - what is next in biochar research?
Stephen Joseph	The University of New South Wales	Australia	The Economics of Biochar; Making it Commercially Viable
Philip.C. Brookes	Zhejiang university	UK	biomass with biochar
Zubin Xie	CAS		Can biochar sustain food security and mitigate climate change
Hao Zheng	Ocean University of China	China	improvement on saline soil with biochar addition
Yang Yang	China University of Geosciences (Beijing)	China	Crop Growth, Heavy Metals and Herbicide Change in Biochar Amended Farmland Soils
Yan Yue	China Agricultural University	China	Salt leaching in the saline soil relative to biochars
Xinde Cao	Shanghai Jiao Tong University	China	Chemicals-facilitated formation of biochar for enhancing carbon stability and heavy metal immobilization
Xueyu Hu	China University of Geosciences (Wuhan)	China	Effect of Biochar on Surface Albedo , Soil Temperature and Moisture in the farmland
Weixiang Wu	Zhejiang university	China	Effect of straw derived biochar on rice paddy
Jun Jiang	Institute of Soil Science, CAS	China	Enhanced adsorption and immobilization of heavy metals induced by biochars in acidic variable charge soils
Shengmao Yang	Zhejiang Academy of Agricultural Sciences	China	products and its potential market of biochar
Dan Tsang	HongKong Polytechnic University	Hongkong	Biochar and Compost for Soil Remediation: Towards Enhanced Effectiveness and Reduced Leaching
Hailong Wang	Zhejiang Agricultural University	New Zealand	Using biochar for remediation of contaminated soils
Jianming Xue	Scion	New Zealand	Using biochar to increase forest soil carbon sequestration
Yu Luo	Zhejiang university	China	Can Biochar remained in soil intrigue further priming effects with substrate input?
Dai Zhongming	Zhejiang university	China	The effects of biochars on the chemical and biochemical properties of acid soils