



## News from the International Biochar Initiative

IBI is a non-profit organization supporting researchers, commercial entities, policy makers, farmers & gardeners, development agents and others committed to sustainable biochar production and use.

Help put the Earth **Back in the Black**

**November 2012**

### IBI Biochar Sustainability Guidelines Update

IBI is several months along in its efforts to develop Sustainability Guidelines for the biochar industry. As a first step, IBI will soon be publishing high-level Guiding Principles that embody the values of right conduct for all aspects of biochar systems, from “Cradle-to-Cradle”. The Principles—vetted by biochar practitioners, researchers and stakeholders worldwide—utilize the concept of the Triple Bottom Line to address potential environmental, social and economic impacts of biochar production and implementation.

IBI is concurrently developing the next phases of the Sustainability Guidelines. Information is being gathered from relevant sustainability initiatives in other industries (e.g. bioenergy, forestry, agriculture) to identify appropriate methods for documenting and measuring sustainability in biochar systems. A Biochar System Typology, describing biochar systems at different scales and operating in different environments, along with Sustainability Checklists for the range of systems is being developed. We envision this leading to an online self-assessment tool that will enable biochar practitioners worldwide to assess the impacts of their operations on “people, planet and profit” i.e. the Triple Bottom Line. We hope to incorporate the capacity for anonymous data collection from biochar projects that will allow practitioners to benchmark the sustainability impact of their projects against industry peers and enable IBI to observe, document, and share trends in the biochar industry.

Be on the lookout soon for the Guiding Principles and updates on this initiative on our website <http://www.biochar-international.org/sustainability> and feel free to submit comments to IBI on this process at any time to: [SustainableBiochar@gmail.com](mailto:SustainableBiochar@gmail.com).

### IBI Biochar Certification Program Announcements

The launch of the IBI Biochar Certification Program is pending completion of documents and on-line forms and processes, which, once finalized, will then undergo legal review and further testing of program materials and online tools. These tasks and other added measures will help ensure that the program works smoothly and effectively for biochar manufacturers seeking IBI Biochar Certification. To help offset the delay in the program’s launch, IBI will be offering a special introductory period with discounted enrollment pricing and certain application requirement waivers for biochar manufacturers who completed testing of their biochar early in anticipation of an earlier launch date.

In the new year, IBI will be offering informational webinars to introduce the IBI Biochar Certification Program, including step-by-step review of the process and online tools. The IBI Biochar Certification Program is based on the testing requirements specified in the International Biochar Initiative (IBI) [\*\*\*Standardized Product Definition and Product Testing Guidelines for Biochar That Is Used in Soil\*\*\*](#) (published in May 2012) and will allow biochar manufacturers to certify that their biochar meets these standards. IBI biochar certification will provide consumers

critical safety and use assurances related to the quality and characteristics of the biochar, and for biochar manufacturers, certification opportunities for biochar materials will provide market and investor assurances that are necessary to drive commercialization of this important industry.

For questions or further inquiries regarding the IBI Biochar Certification Program, please contact us at [certification@biochar-international.org](mailto:certification@biochar-international.org).

## IBI Releases new Research Summary on Biochar and Field Trials

IBI recently published a new research summary of peer reviewed and published literature that highlights the impact of biochar on crop yield, economic performance, fertilizer use efficiency and soil fertility, water uptake/availability, mycorrhizal fungi colonization and microbial activity, and greenhouse gas flux. It exclusively examines biochar field studies, defined as biochar experiments that were located, measured, and observed in the outdoors for an extended period of time (at least one growing season). While not excluding post-growing season lab analyses, this summary does not include any examinations of the effects of biochar in a controlled laboratory setting. The field studies that are included in this research summary ranged in plot size from 1m x 2.25m to 1,000m<sup>2</sup>. We wish to thank the primary author, Josh Laufer, for his dedicated research, writing, editing and revisions as well as the IBI Advisory Committee for their thorough reviews.

The research summary is available at the IBI Publications page (link to: <http://www.biochar-international.org/publications/IBI>) or directly at: [http://www.biochar-international.org/sites/default/files/IBI\\_Field\\_Studies\\_Research\\_Summary\\_final.pdf](http://www.biochar-international.org/sites/default/files/IBI_Field_Studies_Research_Summary_final.pdf).

## Profile: Synergies in Sunitsch Canyon—Tierra Learning Center Discovers Biochar

In September 2012, lightning struck a forested ridge above the Tierra Learning Center in Eastern Washington State in the United States. As operating officer Andrew Holm watched the plume of smoke rising from Sunitsch Canyon, one his first thoughts was, “thank goodness we did all that thinning work”. For the past two years, Andrew and his crew had been learning about forestry and searching for cost effective ways to reduce the thickets of small trees and brush crowding the Center’s forests—a legacy of 100 years of aggressive suppression of natural wildfires that is now coming back to threaten property and lives across the forested regions of the western United States.



The Tierra Learning Center (TLC) is a community-based organization that operates an organic garden, a pre-school, a retreat center and an adult family home for people with developmental disabilities. The center’s philosophy is expressed by asking the question, “what are we drawn here to do together that could not be accomplished alone?”

Land care is a priority for TLC, from the abundant organic gardens that supply meals to workers and visitors, to the forests of fir and pine surrounding the gardens and facilities. Seeking synergies in land management is key, and after learning about biochar, the crew felt it could be an important ingredient in making their forest fuel load reduction activities more ecologically and

economically sustainable. Current practice for dealing with fuel load reduction in forests is to send in thinning crews who cut, pile, and burn the material to dispose of it, at a cost of about \$2,000 an acre. With 220 forested acres to manage, TLC could not afford this waste-disposal approach to woody biomass, a material that ideally should be treated as a valuable resource.

Working with the Chumstick Coalition, a local community forest health group, TLC started looking for beneficial uses for the excess biomass, and started two projects: certified sustainably harvested timber products and biochar production. TLC has done several commercial timber harvests on the land and attained Forest Stewardship Certification (FSC) for the timber products. However, there is still a great deal of lower value biomass to be disposed of.

TLC hit on a way to salvage some value from burn piles by stacking four-foot lengths of the material in a grid pattern and using some of the fine branches and twigs to light a top-burning fire. Top-burning fires are cleaner and hotter (they burn up part of the smoke) and can produce usable amounts of char if they are quenched before it all burns to ash. Read the story of this project on the TLC website (Link to: <http://www.tierralearningcenter.org/news/experimenting-bio-char>).

TLC farm manager Willie Stockman put some of the biochar into his worm bins with positive results and started side-dressing the fields with biochar-worm compost. But with 40 acres of vegetable gardens, orchards and hay and grain fields, the small amount of biochar from the burn piles did not go far. Looking for a more efficient way to produce biochar, TLC decided to work with New England Biochar and build an Adam Retort.

Peter Hirst of New England Biochar arrived onsite in May 2012, and directed the TLC crew in the week-long process of constructing the masonry retort. "It was amazing and fun" said Andrew Holm, "The construction manual is a bit mysterious, but Peter showed up with his magic tricks and somehow it all came together." TLC had hired a master mason to oversee the complex masonry construction job, but for most of the crew, it was all another TLC "learning experience".

Since May, the retort has been operated 6 times, producing about 600 pounds of biochar in each batch. Each run has been somewhat different, Holm said, but the crew is learning more about the different phases of operation and how to optimize them. TLC is now busy building some additional infrastructure that will make operations more efficient. Most critical is a wood storage building that will keep the feedstock dry. They will also be getting an industrial grade leaf vacuum that can crush the char while containing the dust.

Much of the 3600 pounds of biochar produced was applied to the gardens and broadcast in the hayfield, but TLC has also given many bags of biochar away to friends and neighbors in the community. "Community learning is really what we are all about," said Holm. The biochar has been a big hit at the local farmers market where the TLC crew laid out a display of the char pieces. "It can be colorful, with iridescent blues and purples," Holm said. "It attracts a lot of attention."

The fire that ignited up Sunitch Canyon on September 2012 was contained within two days by a fire crew. It burned 13 acres, and it was the third wildfire on the land in 15 years. Tierra Learning Center has plenty of motivation to continue their quest for synergies in dealing with land management issues and biochar will continue to be an important component. For more information on Tierra Learning Center, please see: <http://www.tierralearningcenter.org>.

## Report from the First International Biochar Summer School

The 1<sup>st</sup> International Biochar Summer School “bio: char crossroads” took place in Potsdam, Germany on September 9-16, 2012. The event was organized by the Leibniz Institute for Agricultural Engineering (ATB) and was supported by PEARLS - Potsdam Research Network and Martin-Luther-Universität Halle-Wittenberg. The goal of this summer school was to enhance biochar research worldwide and to contribute to the sustainable development of this research field.

The intensive week offered twenty-three young scientists and young researchers from all over the world a unique platform for training, information sharing and networking. The participants were PhD Students that came from Germany, Spain, Denmark, United Kingdom, Italy, Norway, China, India, and Malaysia. Over twenty international and local experts presented the latest results of different research fields and discussed future research needs, among them Bruno Glaser from the Department of Soil Biogeochemistry of the University of Halle, Germany; Claudia Kammann from the Institute for Plant Ecology, University of Giessen, Germany; Peter Kuikman from Alterra, Wageningen University, Netherlands; Hermann Lotze-Campen from the Potsdam Institute for Climate Impact Research (PIK), Germany; David Wayne, Board member of the International Biochar Initiative, UK; Heike Knicker from the Institute of Natural Resources and Agrobiolgy of Sevilla, Spain; Ellen Graber from the Volcani Center of the Agricultural Research Organization, Israel; and many others.

The week started with a keynote on the Amazonian Dark Earths by the renowned Terra Preta researcher Wenceslau Teixeira from EMBRAPA International Brazil, and also included lectures on biochar research from Bruno Glaser, Claudia Kamman and Jürgen Kern. After an excursion to the research facilities of the ATB, participants had a chance to present posters with their research topics and discuss each subject more intensely.

The following three days were dedicated to major topics in biochar research and development including biochar production, feedstock availability, system integration and biochar characterization as well as soil and biota effects of biochar.

Students first focused on biochar production and feedstock which included sessions on pyrolysis, hydrothermal carbonization, and other alternative carbonization technologies on industrial and community scales. The feedstock topic was addressed during an interactive workshop highlighting the life cycle of biochar and lectures on suitable waste streams for biochar production, as well as controversial issues of biochar and bioenergy in the light of climate change mitigation and feedstock competition.

After the production/feedstock sessions, students focused on system integration and biochar characterization. This included sessions on production and application of chars from sewer sludge and biogas digestate in integrated waste-nutrient streams. The characterization of biochar involved comparing results from studies of biochar effects, method development, and standardization on European and international levels.

Students next examined recent results on biochar and soil effects as well as response of plants and invertebrates on biochar applications in laboratory and field trials.

During the week, Paul Anderson held workshops on low-tech construction of different-sized TLUD (Top-lit updraft gasifier) stoves and production of biochar for communities with little infrastructure. The participants spent time in the lab setting up and evaluating simple and “repeatable-at-home” biochar experiments. Every participant brought a biochar sample from his or her home country to perform experiments which were combined into a biochar race, comparing the performance of biochars in germination tests, earthworm avoidance tests, and water holding capacity tests. The winners of the race received a “Biochar Trophy”.

Participants also worked together on developing a road map for future biochar research in the framework of the open space method. The day brought about tangible ideas on future collaboration within Europe and in Africa.

On Saturday the whole group visited the ATB biochar field trials in Berge, where diverse mixes of biochar, hydrochar, and biogas digestate are being investigated. They also visited a well-known urban gardening project in Berlin called the "Prinzessingarten" which is utilizing biochar and terra preta-like substrates.

The integrated evaluation of the summer school, which took part every day and to a larger extent in the end of the week, showed that the participants acquired a great deal of new information and skills.

## Biochar Briefs: News Roundup for November

We update the website daily with new articles on biochar. For more information, please see: <http://www.biochar-international.org/newsbriefs>.

### **Australia**

Farmers in New South Wales learned about a mobile biochar technology that can turn invasive native scrub into an agricultural resource at a field day in October. The mobile biochar technology transforms woody waste material into biochar without the conventional costs of chipping and transport. (link to: <http://theland.farmonline.com.au/news/state/agribusiness/general-news/turning-woody-weeds-into-biochar/2632815.aspx>)

### **Canada**

Biochar is an emerging technology with endless potential for Alberta, according to expert Anthony Anyia, manager of the bioresource technologies business unit for Alberta Innovates Technology Futures (AITF). (link to: <http://www.lethbridgeherald.com/local-news/biochar-may-help-the-future-grow-111612.html>)

### **Germany**

Trial operations commenced at the first industrial plant for Hydrothermal Carbonization at the end of October 2012. AVA-CO2 will soon commence trial operations at the first industrial plant for the hydrothermal carbonization of biomass worldwide. (link to <http://www.azom.com/news.aspx?newsID=34876>).

### **Ghana**

Soil scientists are exploring new technologies, including the use of biochar, to improve soil fertility in northern Ghana. Test results on the biochar technology which has been on trial since 2010, are said to be positive. (link to: <http://www.ghana.gov.gh/index.php/news/features/17666-scientists-explore-use-of-charcoal-for-soil-fertility>)

### **Japan**

A company in Gifu prefecture Japan has developed a machine that's helping with the recovery of agriculture in Japan's northeast. The device produces biochar that is used to grow tomatoes and rice on salt-polluted soil. The program documents the challenges they faced in achieving a successful harvest. (link to: <http://www.jibtv.com/video/video6.html?n=0>) .

### **Switzerland**

Verora GmbH is producing biochar from sieve residues of tree and shrub cuttings from settlements and agriculture. The benefits can impact animal husbandry and work as a soil conditioner. (link to: <http://www.ee-news.ch/de/biomasse/article/25521/klimastiftung-wunderkohle-fuer-landwirtschaft-und-klima>)

## United States

Students from the University of Washington were part of an interdisciplinary team sponsored by the National Science Foundation that developed a technology to turn woody biomass into biochar. The team initially intended to use the charcoal it generated for energy, but discovered there was a higher demand for biochar as a soil amendment. The technology evolved from a heat-resistant blanket thrown over woody debris to portable panels that are assembled around a slash pile, forming a kiln. (link to: <http://www.wasterecyclingnews.com/article/20121109/NEWS02/121109939/university-students-invent-way-to-curb-wood-waste>).

Google is running one of its campus vehicles partially on fuel from an up-and-coming biofuels start-up company, CoolPlanet Energy Systems; additionally, the process will produce biochar as a side-product. (link to: <http://blogs.wsj.com/venturecapital/2012/10/24/coolplanets-green-fuel-for-google-one-step-towards-cheap-gas-from-biomass>).

GreenTree Garden Supply out of Ithaca New York is looking to expand its line of hydroponic products to include biochar in addition to other soil amendments such as coir, which is harvested from coconut husks and is an ideal growing medium. (Link to: [http://www.theithacajournal.com/article/20121030/NEWS01/310300050/Hydroponic-specialist-grows-into-new-space?odyssey=nav%7Chead&qcheck=1&nclick\\_check=1](http://www.theithacajournal.com/article/20121030/NEWS01/310300050/Hydroponic-specialist-grows-into-new-space?odyssey=nav%7Chead&qcheck=1&nclick_check=1)).

## Opportunities in Biochar

- Get a free subscription to Biomass Magazine: more information at: <http://www.biochar-international.org/node/3797>.
- Download an Open Source ebook: *Understanding Stoves for Environment and Humanity* by Dr. N. Sai Bhaskar Reddy has been published by MetaMeta, The Netherlands. For more information see <http://www.biochar-international.org/node/3690>.
- New job postings at: <http://www.biochar-international.org/network/jobs>.

## Upcoming Calendar Events

- January 17 – 18, 2013: 1<sup>st</sup> Mediterranean Biochar Symposium, Biochar: past, present and future. Location: Italy. For more information: <http://www.biochar-international.org/node/3581>.
- February 7 – 8, 2013: 31<sup>st</sup> International Activated Carbon Conference. Location: Honolulu HI, USA. For more information: <http://www.biochar-international.org/node/3787>.
- February 14 – 15, 2013: 2<sup>nd</sup> Nordic Biochar Seminar. Location: Helsinki, Finland. For more information: <http://www.biochar-international.org/node/3447>.
- February 14 – 18, 2013: 2013 AAAS Annual Meeting. Location: Boston, MA, USA. For more information: <http://www.biochar-international.org/node/3779>.

See the [IBI Calendar page](#) for more events. To add an event to the calendar, send the information to [info@biochar-international.org](mailto:info@biochar-international.org).

## Regional Biochar Group Updates

To read more on the 46 regional and national biochar groups, please see IBI's website (link to: <http://www.biochar-international.org/network/communities>). This month includes updates from Malaysia, the Philippine Biochar Association, and the Saudi Biochar Research Group.

### **Malaysia**

(Reported by Sieng-Huat Kong and Arasu Uttran). The Biochar Experimenter Kit (BEK) at the Malaysian Palm Oil Board (MPOB) is now encased in a shelter with concrete flooring and flue gas extraction system (Figure 1). Mr Kong Sieng-Huat, a master student at Universiti Kebangsaan Malaysia (UKM), has tested the BEK and found that it can yield a 30% palm kernel shell (PKS) biochar from the current controlled conditions in batch production (retort mode). The biochar is



**Figure 1** BEK protected from the elements in its new shelter (left) and PKS biochar produced (right).

then subjected to a series of physico-chemical characterizations to determine the most suitable biochar to be used in a designed field trial study. A mini workshop was also conducted recently from 17-19 October 2012 to give local participants a better understanding of the operation of the BEK.

In March 2012, construction of a plant nursery facility began at Universiti Kuala Lumpur (MICET), Melaka, funded by the Malaysian Palm Oil Board (MPOB) (Figure 2). The purpose of this facility is to study the effect of biochar produced from oil palm plantation waste such as PKS, oil palm trunks, empty fruit bunches (EFB), and fronds on the growth of oil palm seedlings. Parameters such as cation exchange capacity (CEC), soil pH, water holding capacity, biomass yield, and chlorophyll content of palm oil leaves have been investigated. The nursery has a capacity for 200 plants with an automatic irrigation system. The project is being conducted by postgraduate (Arasu Uttran) and final year undergraduate students (Farain Zainal and Subki Awang) from the Environmental Engineering Technology Section supervised by Dr Robert Thomas Bachmann [bachmann@micet.unikl.edu.my](mailto:bachmann@micet.unikl.edu.my) (UniKL MICET) and Dr Loh Soh Kheang (MPOB)

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**Figure 2** Rainshelter with automatic irrigation system with drips for 200 plants.

### **Philippine Biochar Association**

The Biochar Road show, a project being implemented by the Development Society of the Ateneo de Manila University, is an awareness campaign that targets the educated youth from the top universities in the Philippines. With the establishment of the Philippine Biochar Association in 2010, biochar technology has been introduced to the agricultural practices of the country. The Biochar Road Show highlights the great benefits of using biochar in agricultural practices to the environment while promoting the Philippine Biochar Association's work with local farmers and government units. The Biochar Road show will be setting up their displays inside the top universities of the Philippines to raise awareness and spark interest among student bodies of Ateneo de Manila University, De LaSalle University, University of Santo Tomas, and University of the Philippines Diliman. The event will run from November 2012 to February 2013. Although the idea of environmental awareness has been around for a long time, this event is different in the way it highlights the issues of carbon emissions and greenhouse gases and showcases solutions. The road show takes into account what students already know about the problem, and provides outreach on innovative solutions such as presenting biochar as a new innovation that can help reduce carbon emissions while being able to help fellow Filipinos with agricultural lifestyles. The Philippines is naturally an agricultural country, making it easier for university students to see the great deal of change they would be able to make by supporting biochar and the efforts of the Philippine Biochar Association. These students will one day be the future of the country, and even just a handful of them can make a great impact on the country's environmental future.

### **The Saudi Biochar Research Group (SBRG)**

After the first successful application for NPST (The National Plan for Science and Technology) research scheme program, SBRG got a second funded research project titled "Biochar and activated carbon as a means for reducing levels of pesticide residues in contaminated soils to preserve water and plant resources". The newly accepted research is expected to start in February 2012. In this new project biochar will be examined as a potential substrate for soil remediation from pesticides residue. The study will focus on the effect of biochar and activated carbon on pesticides residue transportation and transformations in soil solution system. The research group started a partnership with Prof. Dr Gerard Cornelissen from the Norwegian Geotechnical Institute (NGI) to act as project consultant.

Additionally, there are some diverse ongoing interdisciplinary research activities related to biochar research taking place in the soil science department at King Saud University. An experiment to start this season will study the effect of biochar on soil nitrogen forms and transportation as well as the effect of biochar on GHG emissions from cultivated soils. The soil physics group is

finalizing a laboratory soil column trial to investigate the effect of biochar on soil water relations. In soil chemistry, laboratory research is ongoing to optimize the production of acidified biochar that can be safely incorporated to alkaline soils.

Finally, senior SBRG researchers Prof Alwabel and Prof Al-Omran visited the Korean Biochar research center (KBRC) in August 2012 and met with Prof Yong Sik Ok, the director of the KBRC. The visit included visiting labs, meeting the research head and his team, and discussing the future cooperation between the KBRC and SBRG.

## Recently Published Biochar Research

IBI tracks all published research on biochar and includes it in our [online bibliography](#). The following articles were added in the last month. Please visit the website bibliography for more information on any of these articles. Due to copyright, we cannot provide full copies of articles unless we have permission from the publisher. If you have published work that is not included, [please email us](#).

Ameloot, Nele; Stefaan De Neve; Kanagaratnam Jegajeevagan; Güray Yıldız; David Buchan; Yvonne Nkwain Funkuin; Wolter Prins; Liesbeth Bouckaert; Steven Sleutel (2012). Short-term CO<sub>2</sub> and N<sub>2</sub>O emissions and microbial properties of biochar amended sandy loam soils. *Soil Biology and Biochemistry*.

Angin, Dilek (2012). Effect of Pyrolysis Temperature and Heating Rate on Biochar Obtained from Pyrolysis of Safflower Seed Press Cake. *Bioresource Technology*.

Angst, Teri E.; Saran P. Sohi (2012). Establishing release dynamics for plant nutrients from biochar. *Global Change Biology Bioenergy*.

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Fendt, Alois; Robert Geissler; Thorsten Streibel; Martin Sklorz; Ralf Zimmermann (2012). Hyphenation of two simultaneously employed soft photo ionization mass spectrometers with Thermal Analysis of biomass and biochar. *Thermochemica Acta*.

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