December 2013 News from the International Biochar Initiative

IBI's End of the Year Synopsis for 2013 Highlights Activities

As IBI's Executive Director, I recently shared some IBI highlights from 2013 in a letter to our members. At the top of our list of achievements in 2013 I highlighted the development of the first-ever *IBI Biochar Certification Program*, built upon the biochar material requirements of the *IBI Biochar Standards.* Both programs provide critical formative steps towards product certainty necessary to develop a robust biochar industry. The programs enable everyone from researchers to producers to consumers to articulate and identify what biochar is, and as importantly, what it is not. The *IBI Biochar Certification Program* allows biochar producers to pass rigorous testing requirements to show that their biochar products meet exacting standards, and to then carry an *IBI Certified Biochar*™ seal, which verifies product safety and use as a soil amendment. The *IBI Certified Biochar*™ seal provides important product differentiation for producers and consumers.

Additionally, IBI can chalk up the following accomplishments during the 2012 – 2013 Fiscal Year (which ended June 30, 2013), due in no small part to the unwavering support and contributions of our members, stakeholders, Board of Directors, staff, and Advisory Committee members:

- IBI's Board of Directors recruited new Board Members from a variety of backgrounds intended to help continue to broaden our focus while honing our successes and goals and achievements in critical areas.
- With our colleagues and partners The Climate Trust and The Prasino Group, we developed a Biochar Carbon Offset Methodology for voluntary carbon markets. The methodology embeds the *IBI Biochar Standards* to ensure safety, quality, and consistency of the biochar product used in projects that will utilize the methodology, which is currently undergoing an accreditation and approval process by the American Carbon Registry.
- We began researching and exploring the development of a Biochar System Sustainability Program targeted at sustainable biochar production and utilization systems at all scales. Our vision is that the Program will initially be a self-certification program aimed at benchmarking of individual systems against an anonymous, industry-wide aggregate, in a manner that will encourage and provide a roadmap for continuous improvement of individual projects and systems, over time.
- Our staff and Board of Directors have continued to engage in many other related efforts on behalf of the global biochar community, including participation and presentations at regional, national, and international biochar conferences, continuing to spread the word on biochar and IBI, and increasing our communications and outreach through materials development, our website and our monthly newsletter.
- Working with interns and our Advisory Committee members, IBI started an industry tracking initiative to better record the growth of both commercial biochar operations and projects around the globe.
- IBI continued to track and report progress in all aspects of the biochar field, including science and technology, policy, market, and project development, and media coverage of biochar through our newsletter and website.

We also have many exciting new plans and projects underway at IBI in the current fiscal year, including:

- Awarding our first *IBI Biochar Certification* to Cool Planet for their Cool Terra Biochar™;
- Developing our first major science and policy updates to the *IBI Biochar Standards* in parallel with the first major revision to the *IBI Biochar Certification Program*;
- Planning the release of the first *State of the Biochar Industry Report*, to document trends, developments, and outlooks in all aspects of the biochar industry; and
- Working with global industry partners to establish crop-specific responses to biochar to enhance the environmental footprints of commodity and food production.

For IBI to make a difference, we are counting on people like you to support our work. IBI is the world's foremost authority and source of credible, balanced information on biochar, and has amassed a global information platform and network of members and supporters for the exchange of information on biochar. We urge you to join us or continue to support us as we collectively work towards a more sustainable future.

Announcing IBI's Upcoming *State of the Biochar Industry Report*

IBI is pleased to announce that we will be releasing our first State of the Biochar Industry Report in January 2014. The report is based on industry and project survey results from the biochar community as well as a full industry database of known biochar companies. It is intended to provide a broad overview of the current state of the biochar sector and to give biochar stakeholders a snapshot of commercial and non-commercial biochar activities, all within the context of larger forces that influence the biochar space, including agriculture, greenhouse gas markets, and public policies.

IBI will make an announcement when the full report is published and made available for download. IBI members (link to www.biochar-international.org/join) will have pre-access to the report in advance of the public.

IBI Welcomes new Membership Coordinator, Daniel Chapman

IBI is pleased to introduce our new Membership Coordinator Daniel Chapman, who has transitioned into the position from departing staff Lourdes Haro. We wish Lourdes all the best and thank her for the invaluable time and energy she put into setting up and managing IBI's membership database and working with our members.

An Australian living in Japan, Daniel Chapman has worked in IT for over 20 years as a trainer and developer often with a focus on non-profits, Open Source, and the web. He has worked for Oracle Australia, The Mambo Foundation, several Australian Universities including Monash, Deakin, and La Trobe, and currently also works at The Linux Foundation. A keen self-sufficiency farmer, he was introduced to biochar several years ago while researching sustainable farming and has been passionate about it ever since. Daniel's email is membership@biochar-international.org.

Reminder: Open Public Comment Period for Proposed Policy Revisions to the *IBI Biochar Standards*

IBI is seeking input to proposed policy revisions to the IBI Biochar Standards, and if you have not already provided input, we would greatly appreciate you taking the time to do so now. You can directly send us feedback on the proposed revisions via this online survey (link to http://www.surveygizmo.com/s3/1473529/Proposed-Policy-Revisions-in-the-IBI-Biochar-

Standards-V2-0) or read the revisions in PDF here (link to http://www.biochar-international.org/sites/default/files/Public_Comment_IBI_Biochar_Standards_V2.0.pdf).

The purpose of the open comment period is to gather feedback from stakeholders on proposed policy revisions to the *IBI Biochar Standards*—a document intended to establish a common definition for biochar, testing and measurement methods for selected physicochemical properties of biochar, and labeling standards for biochar.

The current proposed revisions are based on input received from a panel of expert reviewers, including representatives from the University of New South Wales (Australia); Alberta Innovates (Canada); Fraunhofer Institute for Environmental, Safety, and Energy Technology (Germany); Massey University (New Zealand), Norwegian Geotechnical Institute (Norway); Agroscope, Swiss Federal Office for Agriculture (Switzerland); Cornell University (USA); Control Laboratories (USA); and Midwest Laboratories, Inc. (USA).

Pending close of the public comment period, IBI will review all public and stakeholder input, and if necessary glean further input and advice from expert panel reviewers. Based on some questions raised to date, and some misperceptions regarding the proposed changes, IBI will hold a webinar after the close of the public comment and prior to finalization of the proposed changes to the *IBI Biochar Standards*, to clarify the intent of the draft final changes. We will announce the webinar date as soon as we can determine the timeframe required to address comments. Given that the public comment period closes on **January 8, 2014**, we anticipate the webinar will take place in late January or early February, after which edits will be made and a final draft announced to the public for closing comments. The publication of Version 2.0 of the *IBI Biochar Standards* will follow shortly thereafter.

Again, we encourage you to participate in this important stakeholder comment period if you have not done so already by clicking here (link to http://www.surveygizmo.com/s3/1473529/Proposed-Policy-Revisions-in-the-IBI-Biochar-Standards-V2-0).

If you have any questions or would like to send comments under separate cover please contact us at standards@biochar-international.org. You may also email us any supporting materials that you feel are relevant to any of the proposed policy changes. IBI thanks our members, stakeholders, and the biochar community in advance for your contributions to this important effort to support the growing biochar industry.

Business and Organization Member Profiles

A listing of all current IBI Business and Organization Members can be found on our website. For more information on membership opportunities and benefits, or to join, please see: http://www.biochar-international.org/join. Please note, Business and Organization descriptions are submitted by each individual entity, and are not developed or written by IBI.

New Business Member:

Ibero Massa Florestal, Lda was founded in 2011 in Portugal. The company produces charcoal and transforms its derivatives into pellets and charcoal briquettes, as a sustainable and environmentally friendly renewable fuel, and into Biochar for improving agricultural soils.

Ibero Massa Florestal is a pioneer in the implementation of the new industrial technology of agroforestry biomass carbonization by a slow pyrolysis process, without CO_2 emissions; it is also the first

imflorestal
renewable green energy

industry in Portugal with high calorific power pellets and charcoal briquettes. The company's strategy is to sustainably utilize natural resources, such as agroforestry wastes, with technologically innovative solutions. For more information, please go to: www.imflorestal.com or contact Fernando Rocha at geral@imflorestal.com.

Renewing Organization Member:

Burdekin Bowen Integrated Floodplain Management Advisory Committee Inc. (BBIFMAC) is a non for profit community natural resource agency covering the catchment areas of the Bogie, Don, Elliot, Burdekin and Haughton Rivers in the Burdekin and Whitsunday Shires in North Queensland, Australia. BBIFMAC's overall vision is to assist in the management of the natural resources in such a way as to ensure social wellbeing, primary production, and ecological sustainability of the Burdekin-Bowen floodplain. Being a non-government, community owned NRM agency provides the unique opportunity for BBIFMAC to engage industry and community in a neutral and unbiased manner. BBIFMAC promotes an integrated, strategic and community-driven approach to the management of natural resources. We support the sustainable development of primary industries and the local economy for the long term benefit of present and future generations. For more information, please see http://www.bbifmac.org.au or contact Tom McShane at tom@bbifmac.org.au.

Biochar Briefs: News Roundup for December

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

Germany
The German-based research firm TTZ Bremerhaven is launching a project to investigate the application of hydrothermal carbonization (HTC) processes to convert wet biomass into products such as HTC carbon. Eight partner organizations from four EU countries are collaborating on the 30-month project. They will also explore the different products that can be obtained from selected waste streams following the HTC process and develop quality and safety standards and techniques for the resulting products which could include fuel, activated carbons for water treatment, soil remediation, or carbon sequestration. (link to: http://biomassmagazine.com/articles/9799/eu-project-focuses-on-htc-processing-of-wet-biomass).

Spain
The research group, Resource Exploitation of the Technical University of Madrid (UPM), is looking at possible applications for biochar produced from sewage sludge, taking into consideration the issues of high level of salts, metals, and organic compounds which can be toxic. They are closely studying the specific issues around preparation and characterization of this material for potential use. (link to: http://www.sciencedaily.com/releases/2013/12/131216080318.htm?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+sciencedaily%2Fplants_animals+%28ScienceDaily%3A+Plants+%26+Animals+News%29)

United States
Lincoln University students and professor Raimund Bayan have been creating biochar and testing it in soils at the University in Jefferson City, MO. So far, biochars produced from miscanthus and switchgrass have shown the most successful results in terms of plant growth in the laboratory. The team is also working with Jack Ryan of the Nutrition, Energy, Environment, and Economic Development project, or NEEED, to look at how biochar can help erase hunger in the community.

"We thought well why not put all of this together in a project to develop a community garden, if you will, that will not only produce food for senior citizens particularly but demonstrate the effectiveness of biochar in our local soils. And in so doing, lay ground work for commercialization of the whole thing," said Ryan. (link to: http://www.connectmidmissouri.com/news/story.aspx?id=975488#.UpuM5-J7qu4)

Management practices used on cattle feedlot sites can produce large concentrations of manure which contains excess nutrients, antibiotics, and microorganisms. The U.S. Agricultural Research Service (ARS) is looking at how to minimize the potential runoff of the manure/nutrients through geographic information system (GIS) technologies to map the distribution of contaminants across feedlot sites. To reduce the nutrient runoff, the project is evaluating soil treatments such as alum, biochar, and gypsum in the most contaminated areas. (link to: http://nationalhogfarmer.com/environment/study-looks-protecting-water-near-feedlots)

Cool Planet Energy Systems, which produces Cool Terra Biochar™, not only has received IBI Certification for their product, but also recently received certification from the California Department of Food and Agriculture to be classified as a commercial Organic Product which validates their product for use in organic farming. Cool Planet is also conducting commercial trials with California and Florida farmers which have shown accelerated growth rates, and yield improvements averaging 60%. (link to: http://www.4-traders.com/news/Cool-Planets-Cool-Terra-Biochar-Receives-International-Biochar-Initiatives-1st-Certification-Cal--17617892)

Opportunities in Biochar

- Job postings can be accessed at: http://www.biochar-international.org/network/jobs.
- Looking for potential grant funding? Check out the Terra Viva Grants Directory which develops and manages information about grants for agriculture, energy, environment, and natural resources in the world's developing countries at: http://www.terravivagrants.org/Home.
- Submit an Abstract for EGU 2014: "Strategies for effective soil carbon sequestration through synergies in pyrogenic carbon, charcoal and biochar research"; due January 16, 2014. For more information, see: http://www.biochar-international.org/node/4612.

Upcoming Calendar Events

- January 16 - 17, 2014: 2nd Mediterranean Biochar Symposium. Location: Palermo, Italy. For more information: http://www.meditbiochar.org/the-symposium.html.
- March 4 – 6, 2014: World Bio Markets 2014. Location: Amsterdam, the Netherlands. For more information: http://www.biochar-international.org/node/4065.
- March 24 – 26, 2014: International Biomass Conference & Expo (IBCE). Location: Orlando, FL, USA. For more information: http://www.biochar-international.org/node/4600.
- March 30 – April 2, 2014: The 29th International Conference on Solid Waste Technology and Management. Location: PA, United States. For more information: http://www.biochar-international.org/node/4115.
- April 27 – May 2, 2014: EGU 2014: "Strategies for effective soil carbon sequestration through synergies in pyrogenic carbon, charcoal and biochar research". Location: Vienna, Austria. For more information: http://www.biochar-international.org/node/4612.

See the IBI Calendar page for more events. To add an event to the calendar, send the information to info@biochar-international.org.

Regional Biochar Group Updates

To read more on the 55 regional and national biochar groups, please see IBI's website (link to: http://www.biochar-international.org/network/communities). This month includes updates from the UK Biochar Research Centre, E2BEBIS (Central Europe), the Alberta Biochar Initiative (Canada), the Illinois Biochar Group (United States), and the Warren Catchments Council (Australia).

United Kingdom Biochar Research Centre (UKBRC)
The UKBRC has initiated an independently hosted and supported on-line biochar sample management database. It enables distributed researcher networks to manage their own samples and then share in a managed way with other database users, meta data and analytical results for selected entries. This database will be announced in the coming month. For more information on the UKBRC, please see: http://www.biochar.ac.uk/index.php.

E2BEBIS (Environmental and Economic BEnefits from Biochar clusterS in the Central area), Central Europe
E2BEBIS tackles the limited use of biochar in Central Europe, the lack of a proper legal framework on biochar on the EU level, as well as on national levels in the participating countries, and the low awareness of the potential benefits of biochar among policy-makers and other stakeholders. The project runs from June 2012 until November 2014 and consists of a series of activities targeted at all biochar-related stakeholders (e.g. public authorities, scientific community, agriculture sector, energy suppliers and end users) aimed at developing good practices related to biochar. For more information about the project and the ongoing activities, please visit the official website of the project (link to www.e2bebis.eu).

ABI (Alberta Biochar Initiative), Canada
ABI and Olds College organized their first quarterly technical meeting in Alberta (Dec 5, 2013) to catch-up with the development on research and markets in Alberta and western Canada. About 32 participants from Alberta region were at the event representing Alberta industries, academia, and government branches. There were several technical presentations and plenty of networking opportunities for the participants. These quarterly technical meetings will be jointly organized by ABI partners and ABI itself around various locations continuing forward on a quarterly basis and hope that these events will attract local industries and SMEs, policy makers, farmers, and individuals and help spread the biochar knowledge. For more information, please see: http://albertabiochar.ca/abi-quarterly-technical-meeting-dec-5-2013-download-presentations.

One of ABI's mobile biochar production units (link to: http://albertabiochar.ca/equipment) hit the road in October for onsite biochar production at Natural Resources Canada/Canadian Forest Service/Canadian Wood Fibre Centre (CWFC) in Edmonton. On October 24 and 25, CWFC hosted a demonstration of the unit and field tour, where development of woody biomass production and its subsequent conversion (biochar) were highlighted. Roughly 30 participants participated at the event. For more information, see: http://albertabiochar.ca/abi-biochar-unit-hits-the-road.

Illinois Biochar Group, United States
The Illinois Biochar Group fall meeting was held November 15, at the USDA's National Center for Agricultural Utilization Research in Peoria, IL with over 35 people in attendance. The group was given a tour of the USDA labs, and there were a number of new projects and updates on current biochar projects presented. Power points of most of those presentations can be found at www.biochar.illinos.edu. Nancy Holm, the current IBG coordinator, is stepping down as of December 31 and Steve Peterson, who is a research chemist with the USDA's Center for Agricultural Utilization Research will take over as the group coordinator. Steve is conducting studies on biochar characteristics and use as a replacement material in products and also developing other bio-based products.

Warren Catchments Council/Warren Biochar, Australia
The Warren Catchments Council (WCC) is a not-for-profit community-governed natural resource management organization covering an area of approximately 10,000 km^2 in southwest Western Australia. Warren Biochar is a subsidiary community group of WCC which has recently been awarded a grant by the Western Australian government's natural resource management office to study the ability of dung beetles (*Bubas bison*) to incorporate biochar into soils. This project will establish a colony of the dung beetles on a 1000 head dairy farm in Northcliffe, Western Australia. The cows will be fed biochar at a rate 300g/day. The dung beetles' role is to incorporate the biochar infused dung to depths of up to 60cm. This farm-scale trial will determine the impact of dung beetle activity in recycling minerals leached into the subsoil, reducing input needs to improve soil fertility. The effect on pH of the farm's acidic clay soil will be measured as will increases in soil biology, including earthworms. The farm will investigate whether this biological incorporation will renovate compacted perennial pastures, avoiding the need to take the pastures out of production, as typically happens where paddocks are ripped, plowed, and reseeded.

The study will also look at the ability of dung beetles to sequester the labile carbon in manure and recalcitrant carbon in biochar, and to what depths. To date, a local farmer in the area has been free-feeding his beef cattle a biochar lick and evidence on his property indicates beetle activity has caused significant changes in soil nutrient levels. This trial will enable testing to quantify anecdotal observations and limited testing results. Project funding is minimal with an end date December 2015 so testing will not reflect potential gains that are achieved over a longer term but hopefully will indicate trends that encourage more rigorous investigation. For more information, please see: http://www.warrencc.org.au/.

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 infringement laws, 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.

Abit, Sergio M.; Carl H. Bolster; Keri B. Cantrell; Jessamine Q. Flores; Sharon L. Walker (2013). Transport of Escherichia coli, Salmonella typhimurium, and Microspheres in Biochar-Amended Soils with Different Textures. Journal of Environmental Quality.

Ahmad, Mahtab; Anushka Upamali Rajapaksha; Jung Eun Lim; Ming Zhang; Nanthi Bolan; Dinesh Mohan; Meththika Vithanage; Sang Soo Lee; Yong Sik Ok (2013). Biochar as a sorbent for contaminant management in soil and water: A review. Chemosphere.

Baronti, S.; F.P. Vaccari; F. Miglietta; C. Calzolari; E. Lugato; S. Orlandini; R. Pini; C. Zulian; L. Genesio (2014). Impact of biochar application on plant water relations in Vitis vinifera (L.). European Journal of Agronomy. Volume 53, Pages 38–44.

Bian, Rongjun; Afeng Zhang; Lianqing Li; Genxing Pan; Jinwei Zheng; Xuhui Zhang; Jufeng Zheng; Stephen Joseph; Andrew Chang (2014). Effect of Municipal Biowaste Biochar on Greenhouse Gas Emissions and Metal Bioaccumulation in a Slightly Acidic Clay Rice Paddy. Biowaste biochar for rice soil; http://ojs.cnr.ncsu.edu/index.php/BioRes/article/viewFile/BioRes_09_1_685_Bian_Municipal_Biowaste_Biochar/2507.

Boutsika, Lamprini G.; Hrissi K. Karapanagioti; Ioannis D. Manariotis (2013). Aqueous Mercury Sorption by Biochar from Malt Spent Rootlets. Water, Air, & Soil Pollution. 225:1805.

Ding, Wenchuan; Wenlong Peng; Xiaolan Zeng; Xiumei Tian (2013). Effects of phosphorus concentration on Cr(VI) sorption onto phosphorus-rich sludge biochar. Frontiers of Environmental Science & Engineering.

Elleuch, Amal; Ahlem Boussetta; Kamel Halouani; Yongdan Li (2013). Experimental Investigation of a three-layer planar Direct Carbon Fuel Cell using almond shell biochar as fuel. Journées Internationales de Thermique; http://jith2013.uca.ma/JITH2013/Communications/JITH278.pdf.

Fang, Qile; Baoliang Chen; Yajie Lin; and Yuntai Guan (2013). Aromatic and Hydrophobic Surfaces of Wood-derived Biochar Enhance Perchlorate Adsorption via Hydrogen Bonding to Oxygen-containing Organic Groups. Environ. Sci. Technol.

Guo WJ; Liang XF; Lin DS; Xu YM; Wang L; Sun YB; Qin X (2013). Adsorption of Cd2+ on biochar from aqueous solution. European PubMed Central.

Guo, Yanjun; Hua Tang; Guangdi Li; Deti Xie (2013). Effects of Cow Dung Biochar Amendment on Adsorption and Leaching of Nutrient from an Acid Yellow Soil Irrigated with Biogas Slurry. Water, Air, & Soil Pollution. 225:1820.

Gurtler, Joshua B; Akwasi A. Boateng; Yanxue (Helen) Han; and David D. Douds Jr (2013). Inactivation of E. coli O157:H7 in Cultivable Soil by Fast and Slow Pyrolysis-Generated Biochar. Foodborne Pathogens and Disease.

Hardie, Marcus; Brent Clothier; Sally Bound; Garth Oliver; Dugald Close (2013). Does biochar influence soil physical properties and soil water availability? Plant and Soil.

Inthapanya, S.; Preston, T. R. (2013). Biochar marginally increases biogas production but decreases methane content of the gas in continuous-flow biodigesters charged with cattle manure. Livestock Research for Rural Development. Vol. 25 No. 11 pp. Article 189.

Jeffery, Simon; T. Martijn Bezemer; Gerard Cornelissen; Thomas W. Kuyper; Johannes Lehmann; Liesje Mommer; Saran P. Sohi; Tess F.J. van de Voorde; David A. Wardle; Jan Willem Van Groenigen (2013). The way forward in biochar research: targeting trade-offs between the potential wins. Global Change Biology.

Khare, Puja; Uzma Dilshad; P.K. Rout; Vinit Yadav; Shilpi Jain (2013). Plant refuses driven biochar: Application as metal adsorbent from acidic solutions. Arabian Journal of Chemistry.

Kusmierz, Marcin; Patryk Oleszczuk (2013). Biochar production increases the polycyclic aromatic hydrocarbon content in surrounding soils and potential cancer risk. Environmental Science and Pollution Research.

Li, Xiaofang; Fang You; Longbin Huang; Ekaterina Strounina; Mansour Edraki (2013). Dynamics in leachate chemistry of Cu-Au tailings in response to biochar and woodchip amendments: a column leaching study. Environmental Sciences Europe; http://www.enveurope.com/content/pdf/2190-4715-25-32.pdf.

Lu, SG; FF Sun; YT Zong (2014). Effect of rice husk biochar and coal fly ash on some physical properties of expansive clayey soil (Vertisol). CATENA. Volume 114, Pages 37–44.

McBeath, Anna V.; Ronald J. Smernik; Evelyn S. Krull; Johannes Lehmann (2013). The influence of feedstock and production temperature on biochar carbon chemistry: A solid-state 13C NMR study. Biomass and Bioenergy.

Nelissen, Victoria (2013). Effects of biochar on soil processes, soil functions and crop growth. PhD Dissertation. Ghent University. Faculty of Bioscience Engineering.

Paz-Ferreiro, J.; H. Lu; S. Fu; A. Méndez; G. Gascó (2013). Use of phytoremediation and biochar to remediate heavy metal polluted soils: a review. Solid Earth Discuss. 5, 2155–2179; http://www.solid-earth-discuss.net/5/2155/2013/sed-5-2155-2013.pdf.

Prayogo, Cahyo; Julie E. Jones; Jan Baeyens; Gary D. Bending (2013). Impact of biochar on mineralisation of C and N from soil and willow litter and its relationship with microbial community biomass and structure. Biology and Fertility of Soils.

Sharma, Abhishek; Shaobin Wang; Vishnu Pareek; Hong Yang; Dongke Zhang (2013). CFD modelling of mixing/segregation behaviour of biomass and biochar particles in a bubbling fluidized bed. Chemical Engineering Science.

Sun, Daquan; Jun Meng; Wenfu Chen (2013). Effects of abiotic components induced by biochar on microbial communities. Acta Agriculturae Scandinavica, Section B - Soil & Plant Science.

Veksha, Andrei; Hugh McLaughlin; David B. Layzell; Josephine M. Hill (2013). Pyrolysis of wood to biochar: increasing yield while maintaining microporosity. Bioresource Technology.

Vereš, Ján; Jan Kolonicný, Tadeáš Ochodek (2013). Legal status of biochar in Europe. Clean Technologies and Environmental Policy.

Wang, L.; C. R. Butterly; Y. Wang; H. M. S. K. Herath; Y. G. Xi; X. J. Xiao (2013). Effect of crop residue biochar on soil acidity amelioration in strongly acidic tea garden soils. Soil Use and Management.

Yaping, Pang; Huang Shuang; Yang Jinzhong; Peng Ziyun; Wang Yaqing; Zhao Di (2013). Promotion of biochar on adsorption of cadmium and retardation on water transport in paddy soil. Chinese Soc. Agric. Eng.

Zaitun; Nisa, K.; Sufardi; Chairunas; Gani, A.; Slavich, P.; McLeod, M. (2013). Effect of NPK fertilizer and biochar applications on growth and yield of irrigation rice. Improving food, energy and environment with better crops. pp. 72-75.