

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

August 2014 News from the International Biochar Initiative

IBI Members to Vote on Proposed Policy Revisions to the *IBI Biochar Standards*

Beginning on Tuesday, September 2, 2014, IBI will invite dues-paying members in good standing to cast their votes on proposed policy revisions to the *Standardized Product Definition and Product Testing Guidelines for Biochar That Is Used in Soil* (aka the *IBI Biochar Standards*). The proposed revisions address: 1) testing requirements for weathered biochar; 2) timing of testing for post-processed biochar; 3) provisions for high carbon biomass ash; and 4) biochar sampling procedures. **The balloting period will be open for 30 days from September 2nd until October 1st.** If you are not a member and wish to join in order to vote, please go to www.biochar-international.org/join.

The process to incorporate policy revisions into the *IBI Biochar Standards* began in late 2013 and as per IBI's documented process for developing and revising the Standards, has been open, transparent, and inclusive. The proposed changes were based on input from biochar stakeholders and experts, and the process has involved a public comment period, informational webinars, and two rounds of input from biochar experts in the areas being addressed. The amended proposed revisions are now in final form and will be available for review and voting by IBI membership beginning on September 2nd. At that time we will also publish a summary and tally of all comments received during the public comment period and public webinars, including an IBI response to each comment.

After the 30-day balloting period, each of the four proposed revisions will be individually approved or rejected by a simple majority based on the tally of votes of IBI dues-paying members. Approved policy revisions will be published in Version 2.0 of the *IBI Biochar Standards*. We are grateful for the continued participation and support, and constructive feedback received from our members, stakeholders, and the biochar community during this ongoing effort to enhance the relevance and utility of the *IBI Biochar Standards*. If you have any questions, please contact us at standards@biochar-international.org.

Participate in an IBI Public Survey to Collect Information on the Global Biochar Industry

As part of our ongoing efforts to identify trends in the evolution of the biochar industry, <u>IBI has launched a survey to gather data on global biochar enterprise activity in 2014</u>. We request the participation of any individual or business that is actively commercializing a product or service related to biochar to help ensure the report accurately highlights the current breadth of the industry. The data collected will be analyzed and published in aggregated form later this year in our *2014 State of the Biochar Industry Report*. The survey should take 20 minutes or less to complete. You can read more about the survey and report at: http://www.biochar-international.org/2014_industry_survey

As a new feature for the 2014 report, we will include case studies of several biochar businesses which will be chosen from the survey respondents, so be sure to take the survey (we will reach out to all the potential case study subjects prior to publication for more information and to ensure they want to be included).

Please help us further distribute this survey by sending it to any mailing lists, internet discussion forums, or colleagues that are in the biochar industry.

Announcement: Webinar on Proposed CAPCOA Biochar Greenhouse Gas Quantification Protocol

On September 9th, IBI and project partners The Climate Trust and The Prasino Group will provide a technical and procedural briefing via webinar on the proposed protocol for biochar greenhouse gas offsets under the newly formed <u>Greenhouse Gas Reduction Exchange (GHG Rx)</u> administered by the <u>California Air Pollution Control Officers Association (CAPCOA)</u>. The GHG Rx is a registry and information exchange for greenhouse gas emissions reductions designed for projects that generate credits for buyers, all within the state of California in the United States. The protocol—developed in parallel with the American Carbon Registry's *Methodology for Emission Reductions from Biochar Projects*—is commissioned by the Placer County (California) Air Pollution Control District (APCD). The webinar is titled "Development of a GHG Protocol on Behalf of the Placer County APCD for Biochar Projects within the CAPCOA GHG Exchange" and **will take place on September 9th from 4:00-6:00PM EDT**. To register, please click here. After registering, you will receive a confirmation email containing information about joining the webinar.

IBI Webinar Series: A Conversation with Dr. Johannes Lehmann

IBI is thrilled to welcome the world-renowned biochar researcher and IBI Chairman of the Board, Johannes Lehmann, to join us for an October webinar as part of the *IBI Webinar Series*. These webinars allow IBI to connect IBI members to leaders in the biochar field, from business professionals to producers and academics, who will present cutting-edge information, research, and updates to our IBI membership. Each participant will have an opportunity to interact live with the presenter by submitting questions before or during the webinar for live responses, as time permits. Registration is open now.



You must be a dues-paying member to participate in these special events. (If you are not an IBI member and would like to join, <u>please click here</u>. A recording of the webinar will be available afterward, in the member's only area of our website.

Our next webinar will be held on Tuesday, October 21st at 3:00p.m. Eastern Daylight Time with Dr. Lehmann, professor of soil biogeochemistry and soil fertility management at Cornell University. Dr. Lehmann will give a presentation titled "Managing diversity in biochar properties: from material properties to products", and will discuss how biochars come in many "shapes and sizes". The choice of feedstock and pyrolysis conditions dramatically changes the properties of biochars, whether it is pH value, ability to retain water, persistence in soil, or nutrient content. This can be an asset since soil constraints vary, but also a challenge when it comes to assessing suitable biochars for specific soil fertility issues and to communicating many potential values of biochar on a global scale.

If you are interested in attending on October 21st at 3:00pm New York/USA time (EDT), you can reserve your webinar place now at: https://www3.gotomeeting.com/register/788854694. (Note: Please convert the 3:00 pm EDT start time to your local time by using this time converter tool)

For more information on this program, including a link to last month's presentation recording by Dr. Steven McGreevy, please see: http://www.biochar-international.org/webinar_series.

IBI Organization Member Profile

A listing of all current IBI <u>Business</u> and <u>Organization</u> 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.

Renewing Organization Member: Alberta Biochar Initiative (ABI)

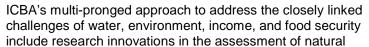
Lakeland College and Alberta Innovates Technology Futures (AITF), with assistance from Western Economic Diversification Canada and industry support, have developed the Alberta Biochar Initiative. The ABI is intended to develop and demonstrate technologies that will enable the large scale commercial deployment of biochar products and biochar applications for the benefit of Albertans.



Established in December 2011, the ABI consists of small-to-medium sized enterprises (SMEs), industry, academia, and government by sharing information, and producing biochar for end-use applications. These applications include soil amendments, reclamation, remediation, horticultural growth media, and lifecycle analysis for potential carbon sequestration applications. For more information, please go to: http://albertabiochar.ca.

Renewing Organization Member: International Center for Biosaline Agriculture (ICBA)

ICBA is a non-profit, autonomous international agricultural research center headquartered in Dubai, UAE. ICBA conducts research and development programs that aim to improve agricultural productivity and sustainability in marginal environments.





resources, climate change adaptation, crop productivity and diversification, aquaculture and bio-energy, and policy analysis. ICBA is working on a number of technology developments including the use of conventional and non-conventional water (such as saline, treated wastewater, industrial water, and seawater); water and land management technologies, and remote sensing and modeling for climate change adaptation. Building capacity and sharing knowledge is an important part of all ICBA does. ICBA's work reaches countries, including least developed countries, in Central Asia and the Caucasus, the Middle East and North Africa (MENA), South and South East Asia, sub-Saharan Africa, and Gulf Cooperation Council countries. For more information on ICBA, please go to: www.biosaline.org.

Biochar Briefs: News Roundup for August

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

Australia

<u>The Simpsons</u>, a farming family in New South Wales, practice sustainable farming methods in their banana groves. These groves have rye grass and native vetch growing between the trees rather than bare earth to help hold nutrients. The grass and vetch, along with banana leaves, is usually cut and

thrown under banana plants for mulch to increase organic content. The family is going to start using biochar in trials on some of its plants to investigate increased nutrient retention.

<u>Euan Beamont was a farmer in Western Australia searching for more sustainable farming practices</u>. So he teamed up with Tom Vogan to co-found Energy Farmers Australia and the pair developed a mobile pyrolysis kiln to produce both heat and biochar for use on farms. "I used to hate burning crop residue like straw, I began to think there must be a better way to utilize that resource, and that's the main driver for me." Mr Beamont said.

Jamaica

The Network of Women (NOW) for Food Security is a women's group in Jamaica which is working to develop Jamaica's emerging bamboo industry and help alleviate rural poverty. Part of this effort has been producing charcoal for sale as a fuel and also biochar as a soil amendment. The group started its operations two years ago, and one of their products is an organic fertilizer made from goat manure eaten by California red worms whose droppings are mixed with biochar.

Opportunities in Biochar

- The US Biochar Initiative (USBI) has put out a request for preliminary proposals to host USBI's 2015 North American Biochar Conference. They are looking for a self-organized group, with a demonstrated interest in biochar and at least 5 members, located anywhere in North America to host the next conference (proposals due September 15). For more information, see: http://www.biochar-international.org/USBI_2015_Conferencerequest.
- Job postings in biochar (as well as research/educational opportunities) can be accessed at: http://www.biochar-international.org/network/jobs.
- The Belfer Center for Science and International Affairs is collecting nominations for the 2015 Roy Family Award for Environmental Partnership; due September 15. For more information, see: http://www.biochar-international.org/node/5204.
- The U.S. Department of Agriculture (USDA) announced funding availability for turning biomass material into energy. For more information, see: http://www.biochar-international.org/node/5153.
- 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.

Upcoming Calendar Events

- September 2 5: Symposium on Thermal and Catalytic Sciences for Biofuels and Biobased Products. Location: Denver, CO, USA. For more information: http://www.biochar-international.org/node/4582
- September 5 7: Bio-charfest 2014. Location: Mullumbimby, Australia. For more information: http://www.biochar-international.org/node/5156
- September 22 25: Biochar Session at ELS 2014 Conference: The Biochar Effect along the soilrhizosphere-plant-atmosphere continuum. Location: Italy. For more information: http://www.biochar-international.org/node/4704
- October 3 5: Bio-Char Workshop at Quantum Leaps Lodge. Location: British Columbia, Canada. For more information: http://www.biochar-international.org/node/5149
- October 5 8: Special Symposium on "Biochar: Production, Characterization and Applications" at CLEAR 2014 Conference. Location: Chuncheon, Korea. For more information: http://www.biochar-international.org/node/4828
- October 8 9: 2nd annual AIDF Food Security Summit. Location: Jakarta, Indonesia. For more information: http://www.biochar-international.org/node/5327

 November 7 – 11: Biochar School: Appropriate Technology for the Small Farm. Location: Sonoma, CA, USA. For more information: http://www.biochar-international.org/node/5338

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

Regional Group Updates

To read more on the 57 regional and national biochar groups, please see IBI's website (link to: http://www.biochar-international.org/network/communities). This month's update is courtesy of the South East Asia Biochar Interest Group at http://sea-biochar.blogspot.com/.

In northern Thailand, the organization Warm Heart has been developing a low-cost, in-field pyrolyzer for poor, small farmers. The pyrolyzer is intended for use with biomass residues like rice and wheat straw, peanuts, potatoes, and soy hay, all of which are too low-density to economically collect and move to a central location for pyrolysis. The unit consists of four wall panels and a roof, all slotted for simple set-up without fasteners. Each piece snaps open and closed to permit easy replacement of the corrugated roofing metal panels. All the materials can be found at local recycling centers; assembly requires a small arc welder and circular grinder/cutter. Each piece weighs approximately 10 kg. The entire unit plus a 200 liter drum of quenching water fit easily in the back of a small truck and can be assembled by two men in less than five minutes. The unit accepts slightly more than 3 cu meters of fuel when packed. It currently runs at 20% efficiency and can be refilled every 2.5 hours. The rainy



season has stopped experimentation for now, but testing will resume in October.

Recently Published Biochar Research

IBI tracks all published research on biochar and includes it in our <u>online bibliography</u>. 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.

Abdullah, Nurhayati; Fauziah Sulaiman, Muhamad Azman Miskam, Rahmad Mohd Taib (2014). Characterization of Banana (Musaspp.) Pseudo-Stem and Fruit-Bunch-Stem as a Potential Renewable Energy Resource. International Journal of Biological, Veterinary, Agricultural and Food Engineering; http://www.waset.org/publications/9998963

Allen, Julia M.; David E. Longer, Edward E. Gbur, and Lichen Hao (2014). The influences of poultry litter biochar and water source on radish growth and nutrition. Discovery; http://arkansasagnews.uark.edu/Discovery2014.pdf.pdf#page=5

Alling, Vanja; Sarah E. Hale, Vegard Martinsen, Jan Mulder, Andreas Smebye, Gijs D. Breedveld and Gerard Cornelissen (2014). The role of biochar in retaining nutrients in amended tropical soils. Journal of Plant Nutrition and Soil Science.

Ameloot, Nele; Steven Sleutel, Sean D.C. Case, Giorgio Alberti, Niall P. McNamara, Costanza Zavalloni, Bram Vervisch, Gemini delle Vedove, Stefaan De Neve (2014). C mineralization and microbial activity in four biochar field experiments several years after incorporation. Soil Biology and Biochemistry.

Baiamonte, Giorgio; Claudio De Pasquale, Valentina Marsala, Giulia Cimò, Giuseppe Alonzo, Giuseppina Crescimanno, Pellegrino Conte (2014). Structure alteration of a sandy-clay soil by biochar amendments. Journal of Soils and Sediments.

Borchard, Nils; Jan Siemens, Brenton Ladd, Andreas Möller, Wulf Amelung (2014). Application of biochars to sandy and silty soil failed to increase maize yield under common agricultural practice. Soil and Tillage Research.

Borkotoki, Bikram; A.K. Agnihotri And K.N. Das (2014). Kinetics of Carbon Mineralization in Mollisols Under Bentonite and Non Bentonite Systems Under Varying Moisture Regimes. Annals of Plant and Soil Research:

http://www.apsragra.org/images/publish/sept 2014 vol 16 no 3/Kinetics%20of%20carbon%20mineraliz ation%20in%20mollisols%20under%20bentonite%20and%20non%20bentonite%20systems%20under%20varying%20moisture%20regimes.pdf

Burke, J.M.; D.E. Longer, and D.M. Oosterhuis (2014). Comparison of Biochar Source on the Vegetative Development of Cotton Seedlings. Research: Summaries of Arkansas Cotton Research; http://arkansasagnews.uark.edu/618-5.pdf

Cao, Cuong T.N.; Claire Farrell, Paul E. Kristiansen, John P. Rayner (2014). Biochar makes green roof substrates lighter and improves water supply to plants. Ecological Engineering.

Chege, Patrick Kamau (2014). Effects of biochar and inorganic fertilizer on french beans (phaseolus vulgaris I) performance in nitisols. Thesis: Kenyatta University; http://ir-library.ku.ac.ke/handle/123456789/10813

Chen, Hongmei; Yunbo Zhai, Bibo Xu, Bobin Xiang, Lu Zhu, Lei Qiu, Xiaoting Liu, Caiting Li, Guangming Zeng (2014). Characterization of bio-oil and biochar from high temperature pyrolysis of sewage sludge. Environmental Technology.

Chu Jun, Xue Jian-Hui, Jin Mei-Juan, Wu Yong-Bo (2014). Biochar to agricultural nonpoint source pollution of nitrogen and phosphorus loss of influence of the progress of Ecology and Rural Environment. Journal of Ecology and Rural Environment.

Clare, Abbie; Simon Shackley, Stephen Joseph, James Hammond, Genxing Pan and Anthony Bloom (2014). Competing uses for China's straw: the economic and carbon abatement potential of biochar. Global Change Biology: Bioenergy.

Cooks, Steven Trent, Jr.(2014). Adsorption of contaminants found in hydraulic fracking produced water utilizing cost-effective biochar treatment Thesis: The University of Texas at San Antonio, Engineering; http://gradworks.umi.com/15/56/1556483.html

Dai, Zhongmin; Yining Wang, Niaz Muhammad, Xiongsheng Yu, Kongcao Xiao, Jun Meng, Xingmei Liu, Jianming Xu and Philip C. Brookes (2014). The Effects and Mechanisms of Soil Acidity Changes, following Incorporation of Biochars in Three Soils Differing in Initial pH. Soil Science Society of America Journal.

Devi, Parmila; Anil K. Saroha (2014). Synthesis of the magnetic biochar composites for use as an adsorbent for the removal of pentachlorophenol from the effluent. Bioresource Technology.

Dicke, Christiane; Giacomo Lanza, Jan Mumme, Ruth Ellerbrock and Jürgen Kern (2014). Effect of Hydrothermally Carbonized Char Application on Trace Gas Emissions from Two Sandy Soil Horizons. Journal of Environmental Quality.

Dzonzi-Undi, Junice; Ondrej Masek, Olusegun Abass (2014). Determination of Spontaneous Ignition Behaviour of Biochar Accumulations. International Journal of Science and Research; http://www.ijsr.net/archive/v3i8/MDIwMTUyNzU=.pdf

Feiner, Roland; Nikolaus Schwaiger, Hannes Pucher, Lisa Ellmaier, Michael Derntl, Peter Pucher and Matthäus Siebenhofer (2014). Chemical Loop Systems for Biochar Liquefaction: Hydrogenation of Naphthalene. RSC Advances.

Feliciano-Bruzual, Cristobal (2014). Charcoal injection in blast furnaces (Bio-PCI): CO2 reduction potential and economic prospects. Journal of Materials Research and Technology.

Ghoneim, Adel Mohamed; Azza Ibrahim Ebid (2014). Impact of rice-straw biochar on some selected soil properties and rice (Oryza sativa L.) grain yield. Research Paper: International Journal of Agronomy and Agricultural Research; http://serv1.vipsmtp.com.md-75.webhostbox.net/innspub.net/wp-content/uploads/2014/05/IJAAR-V3No4-p14-22.pdf

Graber, E.R.; O. Frenkel, A.K. Jaiswal & Y. Elad (2014). How may biochar influence severity of diseases caused by soilborne pathogens? Carbon Management.

Hale, Lauren; Madeline Luth, Robert Kenney, David Crowley (2014). Evaluation of pinewood biochar as a carrier of bacterial strain Enterobacter cloacae UW5 for soil inoculation. Applied Soil Ecology.

Hmid, Amine; Ziad Al Chami, Wouter Sillen, Alain De Vocht, Jaco Vangronsveld (2014). Olive mill waste biochar: a promising soil amendment for metal immobilization in contaminated soils. Environmental Science and Pollution Research.

Hong, Jin; Wang Xiaomin, Yanbin Shen, Gu Zhengrong (2014). A high-performance carbon derived from cornstover via microwave and slow pyrolysis for supercapacitors. Journal of Analytical and Applied Pyrolysis.

Huang H, Wang YX, Tang JC, Tang JC, Zhu WY (2014). Properties of maize stalk biochar produced under different pyrolysis temperatures and its sorption capability to naphthalene. Europe PMC.

Jindo, K.; H. Mizumoto, Y. Sawada, M. A. Sanchez-Monedero, and T. Sonoki (2014). Physical and chemical characterizations of biochars derived from different agricultural residues. Discussion Paper: Biogeosciences Discuss; http://www.biogeosciences-discuss.net/11/11727/2014/bgd-11-11727-2014.pdf

Juang Fu-ying, Wang Feng, Zhu Liu-gang, You Zhi-ming (2014). Application of Biochar for Tea Plantation. Fujian Journal of Agricultural Science; http://www.fjnyxb.cn/CN/abstract/abstract/2453.shtml

Kambo, Harpreet Singh (2014). Energy Densification of Lignocellulosic Biomass via Hydrothermal Carbonization and Torrefaction. Thesis: University of Guelph, School of Engineering; https://dspace.lib.uoguelph.ca/xmlui/handle/10214/8304?show=full

Kappler, Andreas; Marina Lisa Wuestner, Alexander Ruecker, Johannes Harter, Maximilian Halama, and Sebastian Behrens (2014). Biochar as an Electron Shuttle between Bacteria and Fe(III) Minerals. Environmental Science and Technology.

Kidgell, Joel T.; Rocky de Nys, Nicholas A. Paul, David A. Roberts (2014). The Sequential Application of Macroalgal Biosorbents for the Bioremediation of a Complex Industrial Effluent. Plos One; http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0101309

Kong, Sieng-Huat; Soh-Kheang Loh, Robert Thomas Bachmann, Sahibin Abdul Rahim, Jumat Salimon (2014). Biochar from oil palm biomass: A review of its potential and challenges. Renewable and Sustainable Energy Reviews.

Koomson, E. (2014). Measurement of CO2 Emission from Bio-Char-Amended Rice Paddy Field in the Coastal Savannah Zone of Ghana. Thesis: University of Ghana; http://ugspace.ug.edu.gh/handle/123456789/5570

Kumari, H.B.J; Vithanage, M; Dissanayaka, D.M.S.H; Rajakaruna, R.M.P; Seneviratne, G (2014). Novel Bio-Amendments for Phytotoxicity Reduction of Heavy Metals in Contaminated Soils. Research: Faculty of Agriculture, Rajarata University of Sri Lanka; http://repository.rjt.ac.lk/jspui/bitstream/7013/2028/1/18.pdf

Kuppens, Tom; Van Dael, Miet; Maggen, Jens; Vanreppelen, Kenny; Yperman, Jan; Carleer, Robert; Elen, Henri; Van Passel, Steven (2014). Techno-economic assessment of different conversion pathways for pyrolysis char from pig manure.

Lee, Yongwoon; Pu-Reun-Byul Eum, Changkook Ryu, Young-Kwon Park, Jin-Ho Jung, Seunghun Hyun (2014). Characteristics of biochar produced from slow pyrolysis of Geodae-Uksae. Bioresource Technology.

Liangfeng (2014). Effect of Catalyst on carbonization reaction product of nature. China Agricultural University. http://cdmd.cnki.com.cn/Article/CDMD-10019-1014221260.htm

Liu, Xuan; Yang Zhang, Zifu Li, Rui Feng, Yaozhong Zhang (2014). Characterization of corncob-derived biochar and pyrolysis kinetics in comparison with corn stalk and sawdust. Bioresource Technology.

Liu, Zuxiang; Xiaomin Chen, Yan Jing, Qiuxia Li, Jiabao Zhang, Qianru Huang (2014). Effects of biochar amendment on rapeseed and sweet potato yields and water stable aggregate in upland red soil. CATENA.

Malinska, Krystyna; Magdalena Zabochnicka-Swiatek, Jacek Dach. (2014). Effects of biochar amendment on ammonia emission during composting of sewage sludge. Ecological Engineering.

Marks, Evan A. N.; Josep M. Alcañiz, Xavier Domene (2014). Unintended effects of biochars on short-term plant growth in a calcareous soil. Plant and Soil.

Martinsen, Vegard; Jan Mulder, Victor Shitumbanuma, Magnus Sparrevik, Trond Børresen and Gerard Cornelissen (2014). Farmer-led maize biochar trials: Effect on crop yield and soil nutrients under conservation farming. Journal of Plant Nutrition and Soil Science.

McHenry, M.P., Gupta, V.K., Tuohy, T.M., Kubicek, C.P., Saddler, J. and Xu, F. (2014). Biochar processing for sustainable development in current and future bioenergy research. Book Chapter: School of Engineering and Information Technology, Murdock University.

Mitterpach, Jozef; Christoph Adam, Dagmar Samešová (2014). Aspects of Ecodesign when Designing a Retort with Decreased Emissions in the Production of Biochar. Periodical: Advanced Materials Research.

Ngo, Phuong-Thi; Cornelia Rumpel, Thuy Doan Thu, Thierry Henry-des-Tureaux, Dinh-Kim Dang & Pascal Jouquet (2014). Use of organic substrates for increasing soil organic matter quality and carbon sequestration of tropical degraded soil: a 3-year mesocosms experiment. Carbon Management.

Nikbakht, Ali M.; Hadi Javidi, and Hamed Rahmati (2014). Design and Fabrication of a Reactor for Producing Bio-Char from Agricultural Wood Residues. International Conference on Food, Agriculture and Biology; http://iicbe.org/siteadmin/upload/2886C614503.pdf

Nur, M. S. M.; Islami, T.; Handayanto, E.; Nugroho, W. H.; Utomo, W. H. (2014). The use of biochar fortified compost on calcareous soil of East Nusa Tenggara, Indonesia: 2. Effect on the yield of maize (Zea mays L) and phosphate absorption. American-Eurasian Journal of Sustainable Agriculture.

Ochoa, Aitor; Borja Aramburu, María Ibáñez, Dr. Beatriz Valle, Prof. Dr. Javier Bilbao, Prof. Dr. Ana G. Gayubo and Dr. Pedro Castaño (2014). Compositional Insights and Valorization Pathways for Carbonaceous Material Deposited During Bio-Oil Thermal Treatment. Chemistry and Food Science.

Ogbonnaya, Uchenna; Ayodeji Oyelami, Justin Matthews, Olusoji Adebisi and Kirk T. Semple (2014). Influence of Wood Biochar on Phenanthrene Catabolism in Soils. Environments; http://www.mdpi.com/2076-3298/1/1/60/htm

Oh, Seok-Young; Jong-Gil Son, Pei C. Chiu (2014). Black carbon-mediated reductive transformation of nitro compounds by hydrogen sulfide. Environmental Earth Sciences.

Pan; Jing-Jian, Jiang Jun, Xu Ren-Kou, Zhou Li-Xiang (2014). Fe (III) Cr (VI) (Adsorption of Aqueous Cr by Fe-Modified Biochar. Ecology and Rural Environment.

Petruzzelli, L.; Subedi, R.; Bertora, C.; Remogna, E.; Grignani, C. (2014).Biochar: factors influencing its quality. Informatore Agrario Supplemento.

Pituello, Chiara; Ornella Francioso, Gianluca Simonetti, Annamaria Pisi, Armida Torreggiani, Antonio Berti, Francesco Morari (2014). Characterization of chemical—physical, structural and morphological properties of biochars from biowastes produced at different temperatures. Journal of Soils and Sediments.

Prapagdee, Songkrit; Somkiat Piyatiratitivorakul and Amorn Petsom (2014). Activation of Cassava Stem Biochar by Physico-Chemical Method for Stimulating Cadmium Removal Efficiency from Aqueous Solution. Environment Asia; http://www.tshe.org/ea/pdf/vol7no2-08.pdf

Qayyum, M.F.; D. Steffens, H.P. Reisenauer, S. Schubert (2014). Biochars influence differential distribution and chemical composition of soil organic matter. Plant Soil Environment; http://www.agriculturejournals.cz/publicFiles/128953.pdf

Qian, Li; Lin Chen, Stephen Joseph, Genxing Pan, Lianqing Li, Jinwei Zheng, Xuhui Zhang, Jufeng Zheng, Xinyan Yu & Jiafang Wang (2014). Biochar compound fertilizer as an option to reach high productivity but low carbon intensity in rice agriculture of China. Carbon Management.

Rajapaksha, Anushka Upamali; Igalavithana, Avanthi Deshani; Alam, Md. Samrat; Alessi, Daniel S.; and Ok, Yong Sik (2014). Removal of Hexavalent Chromium In Aqueous Solutions Using Different Biochars and Characterization of the Products of the Cr (Vi) Adsorption and Reduction Research. The Geological Society of America (GSA).

Rebitanim, Nur Zalikha and Wan Ab Karim Ghani, Wan Azlina and Mohd Salleh, Mohamad Amran and Alias, Azil Bahari (2014). Carbon dioxide adsorption on coconut shell biochar. Faculty of Engineering, Institute of Advanced Technology.

Ritzberger, Jürgen; Peter Pucher, Nikolaus Schwaiger, Matthäus Siebenhofer (2014). The BioCRACK Process -A Refinery Integrated Biomass-to-Liquid Concept to Produce Diesel from Biogenic Feedstock. Chemical Engineering Transactions; http://www.aidic.it/pres2014/199.pdf

Saito, Masanori (2014). Effect of Biochar on Crop Growth: Research in Japan. Journal of Integrated Field Science; http://ir.library.tohoku.ac.jp/re/bitstream/10097/57394/1/AA12005506-2014-11-66.pdf

Salmani, Mina Sharifat; Farhad Khorsandi, Jafar Yasrebi and Najafali Karimian (2014). Biochar Effects on Copper Availability and Uptake by Sunflower in a Copper Contaminated Calcareous Soil. International Journal of Plant, Animal and Environmental Sciences; http://www.ijpaes.com/admin/php/uploads/643_pdf.pdf

Sattar, Anwar; Gary A. Leeke, Andreas Hornung, Joseph Wood (2014). Steam gasification of rapeseed, wood, sewage sludge and miscanthus biochars for the production of a hydrogen-rich syngas. Biomass and Bioenergy.

Saxena, Manav; Sheli Maity and Sabyasachi Sarkar (2014). Carbon nanoparticles in 'biochar' boost wheat (Triticum aestivum) plant growth. RSC Advances.

Shackley, Simon (2014). Shifting chars? Aligning climate change, carbon abatement, agriculture, land use and food safety and security policies. Carbon Management.

Shi, Li; Ge Zhang, Dong Wei, Tao Yan, Xiaodong Xue, Shusheng Shi, Qin Wei (2014). Preparation and utilization of anaerobic granular sludge-based biochar for the adsorption of methylene blue from aqueous solutions. Journal of Molecular Liquids.

Singh, Y; H S Sidhu (2014). Management of Cereal Crop Residues for Sustainable Rice-Wheat Production System in the Indo-Gangetic Plains of India. Proc Indian Nath Sci Acad; http://insaindia.org/journals/proceedings/Vol80_2014_1_Art11_95_114.pdf

Singla, Ankit; Hirokuni Iwasa, Kazuyuki Inubushi (2014). Effect of biogas digested slurry based-biochar and digested liquid on N2O, CO2 flux and crop yield for three continuous cropping cycles of komatsuna (Brassica rapa var. perviridis). Biology and Fertility of Soils.

Spokas, K.A.; Novak, J.M.; Masiello, C.A.; Johnson, M.G.; Colosky, E.C. and Ippolito (2014). Manure and fertilizer effects on carbon balance and organic and inorganic carbon losses for an irrigated corn field,. Agricultural Research; http://eprints.nwisrl.ars.usda.gov/1547

Teichmann, Isabel (2014). Technical Greenhouse-Gas Mitigation Potentials of Biochar Soil Incorporation in Germany. DIW Berlin, German Institute for Economic Research in its series Discussion Papers of DIW Berlin with number 1406; http://ideas.repec.org/p/diw/diwwpp/dp1406.html

Touray, Njagga; Wen-Tien Tsai, Huei-Ru Chen, Sii-Chew Liu (2014). Thermochemical and pore properties of goat-manure-derived biochars prepared from different pyrolysis temperatures. Journal of Analytical and Applied Pyrolysis

Veera; Europaeus (2014). Biohiilen tuotannon toimintaedellytykset Parikkalassa (Biocarbon production framework Parikkala). Prerequisites for biochar production in Parikkala.

Veksha, Andrei; Waheed Zaman, David B. Layzell, Josephine M. Hill (2014). Enhancing Biochar Yield by Co-pyrolysis of Bio-oil with Biomass: Impacts of Potassium Hydroxide Addition and Air Pretreatment Prior to Co-pyrolysis. Bioresource Technology.

vom Eyser, C.; K. Palmu, R. Otterpohl, T. C. Schmidt, J. Tuerk (2014). Determination of pharmaceuticals in sewage sludge and biochar from hydrothermal carbonization using different quantification approaches and matrix effect studies. Analytical and Bioanalytical Chemistry.

Wells, Naomi S.; and Elizabeth M. Baggs (2014). Char Amendments Impact Soil Nitrous Oxide Production during Ammonia Oxidation. Soil Science Society of America Journal.

Walters, Renaldo C.; Elham H. Fini and Taher Abu-Lebdeh (2014). Enhancing Asphalt Rheological Behavior and Aging Susceptibility Using Bio-Char and Nano-Clay. American Journal of Engineering and Applied Sciences; http://thescipub.com/PDF/ajeassp.2014.66.76.pdf

Wijayanta, Agung Tri; Md. Saiful Alam, Koichi Nakaso, Jun Fukai, Kazuya Kunitomo, Masakata Shimizu (2014). Numerical Study on Pulverized Biochar Injection in Blast Furnace. ISIJ International.Wu Zhi-dan,

Yan, Qiangu; Hossein Toghiani, Zhiyong Cai, Jilei Zhang (2014). Formation of Nanocarbon Spheres by Thermal Treatment of Woody Char from Fast Pyrolysis Process. Wood and Fiber Science; http://www.swst.org/publications/wfs/preprints/46%284%29/WFS1712.pdf

Yang, Yu; Zhongbo Wei, Xiaolong Zhang, Xu Chen, Dongmei Yue, Qian Yin, Lin Xiao, Liuyan Yang (2014). Biochar from Alternanthera philoxeroides could remove Pb(II) efficiently. Bioresource Technology.

Yu, Jinshuai; Yicheng Zhao, Yongdan Li (2014). Utilization of corn cob biochar in a direct carbon fuel cell. Journal of Power Sources.

Yuan, Haoran; Lifang Deng, Yujie Qi, Noriyuki Kobayashi, Jiahuan Tang (2014). Non-activated and activated Biochar derived from bananas as alternative cathode catalyst in microbial fuel cells. Thesis.

Zhang, Lei; Junhua Jiang, Nancy Holm, Fangling Chen (2014). Mini-chunk biochar supercapacitors. Journal of Applied Electrochemistry.

Zhang, Z. X.; J. Wu; J. Meng; W. F. Chen (2014). Research on carbonised process characteristics of biomass. Materials Research Innovations.

Zhao, Mary Yiyue; Akio Enders, Johannes Lehmann (2014). Short- and long-term flammability of biochars. Biomass and Bioenergy.