

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

September 2014 News from the International Biochar Initiative

Final Days to Cast your Vote on Proposed Policy Revisions to the *IBI Biochar Standards*

There is less than one week remaining in the balloting period to vote on proposed policy revisions to the *IBI Biochar Standards*. As a reminder, the balloting period is open for 30 days from September 2nd until October 1st. If you are a dues-paying member in good standing, IBI encourages you to vote on the proposed policy revisions which 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. If you wish to vote but are not an IBI member, please join IBI and vote using the link at the bottom of this article.

After the 30-day balloting period, <u>each of the four proposed revisions</u> 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*. Thank you to all members who have voted to date! We are grateful for the continued participation and support, and the constructive feedback received from our members, stakeholders, and the biochar community—and also to our panel of experts who helped sort through feedback to develop the most relevant revisions possible during this ongoing effort to enhance the utility of the *IBI Biochar Standards*. A summary of comments received during the public comment period and webinars along with IBI responses is available for review.

To read more about the process and submit your vote click here. Please add your voice!

Placer County, CA Biochar Carbon Methodology Webinar Held on September 6

IBI has partnered with The Climate Trust and The Prasino Group to adapt the Biochar Carbon Offsets Methodology currently undergoing the evaluation and approval process with the American Carbon Registry (ACR) for potential use in California. Placer County's Air Pollution Control District is seeking to adapt the protocol for use in the California Air Pollution Control Officers Association Greenhouse Gas Registry (CAPCOA GHG Rx). Upon approval and adoption by Placer County, the protocol will be available for adoption by any CA county. A webinar to review the protocol was held on September 6 for Placer County stakeholders, and marked the start of a public comment period for the Placer County Air Pollution Control District. IBI's Executive Director Debbie Reed participated in the webinar and reviewed the IBI stable carbon methodology embedded in the protocol on behalf of the protocol development team, and participated in the question and answer session at the conclusion of the team's presentation. The Placer County Air Pollution Control District website contains an audiovisual recording of the webinar, a copy of the draft protocol, a link to the PowerPoint presentation utilized during the webinar, and a link for further information on the CAPCOA GHG Rx on its website, located here: http://www.placer.ca.gov/Departments/Air.

The portal also contains a link to submit comments on the protocol to Placer County during the public comment period, which ends on October 5, 2014.

World Bank Hosts Launch Event Held for World Bank Biochar Report Co-Authored by IBI

On Wednesday, September 3, 2014, the World Bank hosted a launch event on Biochar Systems for Smallholders in Developing Countries, a report co-authored by a team of IBI's staff and Executive Director. The event, which was moderated by Gerhard Dieterle, Manager of the World Bank Forest Investment Program, was open to the public, and drew a wide range of interested participants from within the World Bank as well as external stakeholders. IBI Executive Director Debbie Reed participated in the launch, presenting on *Developing Biochar Systems Globally: Tools for Developing Biochar Systems* (standards, methodologies, and policies). Discussants included Ellysar Baroudy, Lead Carbon Finance Specialist at the World Bank, who reported on some biochar projects underway, and plans and prospects for further project investment; Alessandro De Pinto, Senior Research Fellow with IFPRI, who discussed the economics of biochar projects; and Katie Freeman, Agricultural Economist at the World Bank, who discussed promising small-scale opportunities for biochar systems development. The Banks' specialists and panelists discussed the future potential for biochar as part of Climate-Smart Agriculture approaches.

Deadline Extended: Participate in a Survey 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. The data collected will be analyzed and published in aggregated form later this year in our *2014 State of the Biochar Industry Report*.

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. (Note that we will reach out to all the potential case study subjects prior to publication for more information and to ensure their desire to be included in the case studies). Click here to learn more about the survey and report.

IBI Webinar Series: A Conversation with Dr. Johannes Lehmann

IBI is thrilled to welcome world-renowned biochar researcher and IBI Chairman of the Board, Johannes Lehmann, who will deliver a webinar on October 21st as part of the *IBI Webinar Series*. These webinars allow us 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 for real-time interaction 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, please click here). 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", and how the choice of feedstock and pyrolysis conditions can dramatically change the properties of biochars, including the pH value, ability to retain water, persistence in soil, or nutrient content. This variability 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 the many potential values of biochar on a global scale.

If you are interested in participating in the October 21st webinar, scheduled at 3:00pm EDT (New York, USA time), you can reserve your 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.

Biochar Briefs: News Roundup for September

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

Australia

The New South Wales Department of Primary Industries (NSW DPI) has been conducting biochar field trials at their center since 2001; these are believed to be the world's longest running biochar trials. Dr Lukas Van Zwieten, the chief research scientist conducting the trials, commented, "Biochar is a recognised soil amendment and it's recognised as being able to sequester carbon in soil as well as providing a lot of other potential benefits—especially to crop growth."

Malaysia

The largest rooftop garden in South-East Asia, located on a shopping center called 1Utama, opened to the public in 2009. The garden designer and manager Dr Francis Ng used biochar to overcome challenges with both the weight of using soil on the roof and with water—in fact, the garden's source of water is the cold water discharged from the shopping center's air-conditioning system. Says Ng, "There is an international movement to use charcoal in agriculture as a way to fight climate change and improve soil productivity, but even they (producers using biochar as a soil amendment) do not use more than 10% charcoal in the mixture," he said. "When some of the representatives were brought here to visit this garden, they were blown away as we actually use pure charcoal in some zones!"

Peru

A team comprised of researchers from Wake Forest University in the U.S. and the Amazon Conservation Association in Peru are working on making biochar from native Amazonian bamboos. The researchers brought a kiln to rural Peru and are testing different formulations of biochar made from bamboo feedstock—with the goal to see which formulations are most effective at holding nitrogen, carbon, and other nutrients in the soil while simultaneously taking up heavy metals like mercury. They are using bamboo due to its quick growth in deforested or mined areas—holding a lot of potential for local farmers.

Sweden

Stockholm Sweden was one of five cities to win the Mayors Challenge—a competition for European cities to focus on urban challenges. The city's project entitled "Biochar – for a better city ecosystem" will produce biochar from garden waste; the biochar will be used on city trees and in plantings. The project contents that using the garden waste as a biochar feedstock will be much more efficient for them than turning the waste into woodchips.

United States

The mayor of Minneapolis (Minnesota) and the chairman of the Shakopee Mdewakanton Sioux, a Native American tribe, recently signed an agreement promoting the use of biochar in five city demonstration gardens. One of the gardens is near the Indian Health Board Facility in Minneapolis. The idea, according to organic farmer Christina Elias, is to grow more food on smaller plots, near communities that need fresh produce. "We moved in 47 tons of soil," Elias said. "It's strong in Native American practices, and we have Oneida corn, we have the black turtle beans, Cherokee trail climbing beans."

The City of Manteca is setting aside five acres at a school farm in the San Joaquin Valley of California to field test biochar to grow row crops and nurture orchards. "It makes a lot of sense for Manteca to look into

biochar," said Don Smail, the city's economic development specialist, "Five of the top 10 counties in the United States for agricultural production are within two hours of Manteca". Smail also highlighted that the local farmers face the problem of what to do with their field wastes such as almond prunings and hulls, and corn stalks—which make ideal feedstocks for biochar—since they are no longer able to burn them in the fields. The initial biochar used for the field studies will be imported from Oregon, but the city is considering building a unit if the field trials show positive results.

A new brewery, Seven Arrows Brewing Co, is expected to open by late 2015 at Hermitage Hill Farm and Stables in Virginia. Farm owner Craig Nargi worked with a group of James Madison University students to build a biochar production unit to heat the farm's greenhouse using farm crop waste as feedstock. The warm greenhouse has allowed Nargi to grow some crops year-round and the biochar is used in the farm soils to cultivate the hops for brewing. "We kind of make a big circle with everything," Nargi said.

Opportunities in Biochar

- Download a new open access biochar book: Biochar Culture, by Sai Bhaskar N Reddy. The text
 highlights the use of biochar in communities and its potential for increased sustainable agriculture
 in smaller scale farmsteads and homes, focusing on work in India. The book can be accessed at:
 http://www.biocharculture.com.
- Job postings in biochar (as well as research/educational opportunities) 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.

Upcoming Calendar Events

- 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
- October 11: Soil Benefits of Biochar. Location: San Jose, CA, USA. For more information: http://www.biochar-international.org/node/5366
- October 18: Black is the New Green: Grow it Better with Local Biochar. Biochar Expo. Location: Roseburg, OR, USA. For more information: http://www.biochar-international.org/node/5373
- October 23: Making and Firing a Biochar Kiln. Location: San Jose, CA, USA. For more information: http://www.biochar-international.org/node/5370
- 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.

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, <u>please email us</u>.

Amini, Seyedeharezoo (2014). Restoring Native Grassland Function in Urban Environment: Implications for Soil-Plant Relations. Thesis: University of Alberta, Faculty of Graduate Studies and Research, Land reclamation and Remediation; https://era.library.ualberta.ca/public/view/item/uuid:602643c4-4a90-4d20-98c0-03ee27b31cc1/DS1/Amini_Seyedeharezoo_Fall%202013.pdf

Anderson, Carolyn G. (2014). Effects of biosolids-derived pharmaceuticals on microbial communities and nitrogen processes in soil. Thesis: University of California, Davis; http://gradworks.umi.com/15/60/1560063.html

Anthony, Rosemary (2014). Carbon storage in orchards. Thesis: Bangor University; http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.610906

Aysu, Tevfik (2014). Catalytic pyrolysis of Eremurus spectabilis for bio-oil production in a fixed-bed reactor: Effects of pyrolysis parameters on product yields and character. Fuel Processing Technology; DOI 10.1016/j.fuproc.2014.08.014

Bastos, A. C.; M. Prodana, N. Abrantes, J. J. Keizer, A. M. V. M. Soares, S. Loureiro (2014). Potential risk of biochar-amended soil to aquatic systems: an evaluation based on aquatic bioassays. Ecotoxicology; DOI 10.1007/s10646-014-1344-1

Butnan, Somchai; Jonathan L. Deenik, Banyong Toomsan, Michael J. Antal, Patma Vityakon (2014). Biochar characteristics and application rates affecting corn growth and properties of soils contrasting in texture and mineralogy. Geoderma; DOI 10.1016/j.geoderma.2014.08.010

Case, Sean; McNamara, Niall; Reay, D.S.; Chaplow, Jacky; Whitaker, Jeanette (2014). Soil properties and soil greenhouse gas emissions in biochar-amended bioenergy soils incubated under controlled laboratory conditions. Research: NERC - Science of the Environment; http://nora.nerc.ac.uk/508167

Case, Sean; McNamara, Niall; Reay, D.S.; Chaplow, Jacky; Whitaker, Jeanette (2014). Soil properties and soil greenhouse gas emissions in biochar-amended bioenergy soils undergoing long term field incubation. Research: NERC - Science of the Environment; http://nora.nerc.ac.uk/508168

Choi, Gyung-Goo; Seung-Jin Oh, Soon-Jang Lee, Joo-Sik Kim (2014). Production of bio-based phenolic resin and activated carbon from bio-oil and biochar derived from fast pyrolysis of palm kernel shells. Bioresource Technology; DOI 10.1016/j.biortech.2014.08.053

Cowie, Annette L. and Alan J. Cowie (2014). Life cycle assessment of greenhouse gas mitigation benefits of biochar. Thesis: University of New England, NSW Department of Primary Industries; http://www.ieabioenergy-task38.org/publications/T38 Biochar case study.pdf

de la Rosa, José M.; Marina Paneque, Ana Z. Miller, Heike Knicker (2014). Relating physical and chemical properties of four different biochars and their application rate to biomass production of Lolium perenne on a Calcic Cambisol during a pot experiment of 79 days. Science of The Total Environment; DOI 10.1016/j.scitotenv.2014.08.025

de Melo Carvalho, M. T.; A. de Holanda Nunes Maia, B. E. Madari, L. Bastiaans, P. A. J. van Oort, A. B. Heinemann, M. A. Soler da Silva, F. A. Petter, B. H. Marimon Jr., and H. Meinke (2014). Biochar increases plant-available water in a sandy loam soil under an aerobic rice crop system. Solid Earth; http://www.solid-earth.net/5/939/2014/se-5-939-2014.pdf

Dong, Li; Chen Lei, Yang Xia, Songxiao Na, Liu Min Hui, Hao Zheng (2014). Impact of biochar amendments on cabbage growth and utilization of low-quality soil nitrogen and phosphorus: The effects of biochar on growth and uptake of nitrogen and phosphorus for Chinese cabbage in poor quality soil in Ningxia. Environmental Sciences;

http://www.actasc.cn/hjkxxb/ch/reader/view_abstract.aspx?file_no=20131124002

Draper, K (2014). Biochar Paper—elevating biochar from novelty to ubiquity. The Biochar Journal; www.biochar-journal.org/en/ct/15

Elaigwu, Sunday Enenche (2014). Pollution reduction with processed waste materials; http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.612668#sthash.DTfSNOqV.dpuf

Evangelou, Michael W.H.; Anette Brem, Fabio Ugolini, Samuel Abiven, Rainer Schulin (2014). Soil application of biochar produced from biomass grown on trace element contaminated land. Journal of Environmental Management; DOI 10.1016/j.jenvman.2014.07.046

Fang, Ci; Tao Zhang, Ping Li, Rong-feng Jiang and Ying-cai Wang (2014). Application of Magnesium Modified Corn Biochar for Phosphorus Removal and Recovery from Swine Wastewater. International Journal of Environmental Research and Public Health; http://www.mdpi.com/1660-4601/11/9/9217/htm

Fungo, Bernard; Guerena, David; Thiongo, Margaret; Lehmann, Johannes; Neufeldt, Henry; Kalbitz, Karsten (2014). N2O and CH4 emission from soil amended with steam-activated biochar. Environmental Science & Technology; http://agris.fao.org/agris-search/search.do?recordID=US201400084874

Galgani, Pietro; Ester van der Voet, Gijsbert Korevaar (2014). Composting, anaerobic digestion and biochar production in Ghana. Environmental—economic assessment in the context of voluntary carbon markets. Waste Management; DOI 10.1016/j.wasman.2014.07.027

Ghezzehei, T. A.; D. V. Sarkhot, and A. A. Berhe (2014). Biochar can be used to capture essential nutrients from dairy wastewater and improve soil physico-chemical properties. Solid Earth; http://www.solid-earth.net/5/953/2014/se-5-953-2014.pdf

Greening Australia (2014). Biochar and Energy from Trees Project: Background, results and future opportunities for landscape restoration from the strategic establishment of mixed native species plantations in Habitat 141°; http://www.greeningaustralia.org.au/uploads/knowledge-portal/biocharenergy-from-trees.pdf

He, Feifei; Liang Yun Shan, Wu Ai-ping, Rong Xiangmin, Liu Qiang (2014). Effects on acidic soil nitrification different vegetable biochar amount: Effect of biochar on nitrification from vegetable-planting acid soil. Environmental Sciences;

http://www.actasc.cn/hikxxb/ch/reader/view abstract.aspx?file no=20131030001

Herath, I.; P. Kumarathilaka, A. Navaratne, N. Rajakaruna, M. Vithanage (2014). Immobilization and phytotoxicity reduction of heavy metals in serpentine soil using biochar. Journal of Soils and Sediments; DOI 10.1007/s11368-014-0967-4

Huff, Matthew D.; Sandeep Kumar, James W. Lee (2014). Comparative analysis of pinewood, peanut shell, and bamboo biomass derived biochars produced via hydrothermal conversion and pyrolysis. Journal of Environmental Management; DOI 10.1016/j.jenvman.2014.07.016

Hughes, Stephen R.; Juan Carlos López-Núñez, Marjorie A. Jones, Bryan R. Moser, Elby J. Cox, Mitch Lindquist, Luz Ángela Galindo-Leva, Néstor M. Riaño-Herrera, Nelson Rodriguez-Valencia, Fernando Gast, David L. Cedeño, Ken Tasaki, Robert C. Brown, Al Darzins, Lane Brunner (2014). Sustainable

conversion of coffee and other crop wastes to biofuels and bioproducts using coupled biochemical and thermochemical processes in a multi-stage biorefinery concept. Applied Microbiology and Biotechnology; DOI 10.1007/s00253-014-5991-1

Inyang, Mandu; Bin Gao, Andrew Zimmerman, Yanmei Zhou, Xinde Cao (2014). Sorption and cosorption of lead and sulfapyridine on carbon nanotube-modified biochars. Environmental Science and Pollution Research; DOI 10.1007/s11356-014-2740-z

Kang, Se Won; Dong Cheol Seo, Ju Wang Park, Jong Soo Heo, Ju Sik Cho (2014). Evaluation of Fertilizer Characteristics in Biochar Using Agricultural Waste. Korea Journal of Environmental Agriculture Conference; http://www.papersearch.net/view/detail.asp?detail_key=09202676

Kang, Se Won; Dong Cheol Seo, Ju Wang Park, Jong Soo Heo, Ju Sik Cho (2014). Evaluation of Heavy Metal Adsorption Efficiency in Barley Straw Biochar. Korea Journal of Environmental Agriculture Conference; http://www.papersearch.net/view/detail.asp?detail_key=09202677

Kim, Gyeong Jin; Anitha Kunhikrishnan, Won II Kim, Jeong Mi Lee, Nam June Cho (2014). Role of Biochars on the Availability of Arsenic and Cadmium to Earthworms. Korea Journal of Environmental Agriculture Conference; http://www.papersearch.net/view/detail.asp?detail_key=09202672

Kim, Min-Suk; Hyun-Gi Min, Namin Koo, Jeongsik Park, Sang-Hwan Lee, Gwan-In Bak, Jeong-Gyu Kim (2014). The effectiveness of spent coffee grounds and its biochar on the amelioration of heavy metals-contaminated water and soil using chemical and biological assessments. Journal of Environmental Management; DOI 10.1016/j.jenvman.2014.07.001

Kumari, K. G. I. D.; Per Moldrup, Marcos Paradelo, Lis W. de Jonge (2014). Phenanthrene Sorption on Biochar-Amended Soils: Application Rate, Aging, and Physicochemical Properties of Soil. Water, Air, & Soil Pollution: DOI 10.1007/s11270-014-2105-8

Kunhikrishnan, Anitha; Gyeong Jin Kim, Won II Kim, Jeong Mi Lee, Woo Ri Go, Nam June Cho (2014). Influence of Biochars, Red Soil and Vermicompost on Arsenic Availability to Plants, Earthworms and Microorganisms. Korea Journal of Environmental Agriculture Conference; http://www.papersearch.net/view/detail.asp?detail-key=09202674

- Li, Feiyue; Xinde Cao, Ling Zhao, Jianfei Wang, and Zhenliang Ding (2014). Effects of Mineral Additives on Biochar Formation: Carbon Retention, Stability, and Properties. Environmental Science & Technology; DOI 10.1021/es501885n
- Li, M; Lou Z, Wang Y, Liu Q, Zhang Y, Zhou J, Qian G (2014). Alkali and alkaline earth metallic (AAEM) species leaching and Cu(II) sorption by biochar. Chemosphere; DOI 10.1016/j.chemosphere.2014.08.033
- Li, Ronghua; Quan Wang, Zengqiang Zhang, Guangjie Zhang, Zhonghong Li, Li Wang & Jianzhong Zheng (2014). Nutrient transformation during aerobic composting of pig manure with biochar prepared at different temperatures. Environmental Technology; DOI 10.1080/09593330.2014.963692

Licht, Jeff; Hugh McLaughlin, Chris Burns, Frank Shields (2014). Can Biochar Come to the Rescue of Coastal Barren Species? A Controlled Study Reports on the Impact of Biochar Amendment on Their Survival. BioResources;

http://ojs.cnr.ncsu.edu/index.php/BioRes/article/view/BioRes_09_4_6214_Licht_Biochar_Rescue_Coastal_Barren_Species

Lima, Larissa Borges de (2014). Agronomic performance of soybean, fertility and organic matter dynamics in soil under application of Biochar in the Brazilian Cerrado. "Thesis: University Federal Goiás,

School of Agronomy;

http://repositorio.bc.ufg.br/tede/bitstream/tde/3024/5/Lima,%20Larissa%20Borges%20de%20-%202014.pdf#page=59

Lima, Larissa Borges de (2014). Desempenho agronômico da soja, fertilidade e dinâmica da matéria orgânica em solos sob aplicação de biochar no cerrado brasileiro (Agronomic performance of soybeans, fertility and organic matter dynamics in soils under application of biochar in the Brazilian cerrado). Thesis: Universidade Federal de Goiás [Federal University of Goiás], Escola de Agronomia e Engenharia de Alimentos - EAEA (RG) [School of Agronomy and Food Engineering - EAEA (RG)]; http://repositorio.bc.ufg.br/tede/handle/tde/3024

Liu, Biao; Chen YingQuan; Meng HaiBo; Yao ZongLu; Wang XianHua (2014). Burning and adsorption characteristics of char obtained from pyrolysis of cotton stalk and rapeseed straw. Transactions of the Chinese Society of Agricultural Engineering

Ma, Rui; Jianlin Shen, Jinshui Wu, Zhong Tang, Qirong Shen, Fang-Jie Zhao (2014). Impact of agronomic practices on arsenic accumulation and speciation in rice grain. Environmental Pollution; DOI 10.1016/j.envpol.2014.08.004

Ma, Yuhui; Qunhui Wang, Xiaohong Sun, Xiaoqiang Wang (2014). A novel magnetic biochar from spent shiitake substrate: characterization and analysis of pyrolysis process. Biomass Conversion and Biorefinery; DOI 10.1007/s13399-014-0147-1

Muter, Olga; Andrejs Berzins, Silvija Strikauska, Iveta Pugajeva, Vadims Bartkevics, Galina Dobele, Jaak Truu, Marika Truu, Christoph Steiner (2014). The effects of woodchip- and straw-derived biochars on the persistence of the herbicide 4-chloro-2-methylphenoxyacetic acid (MCPA) in soils. Ecotoxicology and Environmental Safety; DOI 10.1016/j.ecoenv.2014.08.012

Nguyen, Dai H; Johannes Biala, Peter R Grace, Clemens Scheer and David W Rowlings (2014). Greenhouse gas emissions from sub-tropical agricultural soils after addition of organic by-products. SpringerPlus 2014: Earth and Environmental Sciences; DOI 10.1186/2193-1801-3-491

Ofori, Rachel Asantewa (2014). Integrated Waste Management-Source Separation and Composting Of Household Waste in the Ayuom Farming Community in the Bosomtwe District of the Ashanti Region. Thesis: Kwame Nkrumah University of Science and Technology, Department of Materials Engineering; http://ir.knust.edu.gh/handle/123456789/5427

Ogbonnaya, Uchenna; Olusoji O Adebisi and Kirk T Semple (2014). Impact of Biochar on the Bioaccessibility of 14C-phenanthrene in Aged Soil. Environmental Science: Processes & Impacts; DOI 10.1039/C4EM00396A

Oh, Seok-Young and Yong-Deuk Seo (2014). Sorptive Removal of Nitro Explosives and Metals Using Biochar. Journal of Environmental Quality; DOI 10.2134/jeq2014.02.0097

Olivier, Paul A.; Nguyen Van Ket, Todd Hyman (2014). Empowering the Poor Through Waste Transformation: An Unconventional Way Of Raising Pigs, Chickens and Cows; https://dl.dropboxusercontent.com/u/22013094/Paper/Summaries/Alternative%20to%20Biodigestion.pdf

Oriaku, Timi Otegha (2014). The impact of nutrient and biodiesel amendments on the biodegradation of hydrocarbons in contaminated soil. Thesis: Newcastle University, School of Civil Engineering and Geosciences; https://theses.ncl.ac.uk/dspace/handle/10443/2345

Park, Jong Hwan; Seong Heon Kim, Dong Cheol Seo, Ju Sik Cho, Jong Soo Heo (2014). Competitive Adsorption Characteristic of Sesame Straw Biochar on Heavy Metals. Korea Journal of Environmental Agriculture Conference; http://www.papersearch.net/view/detail.asp?detail_key=09202696

Park, Ju Wang, Dong Cheol Seo, Se Won Kang, Jong Soo Heo, Ju Sik Cho (2014). Evaluation of Greenhouse Gas Emission Characteristics in Broccoli Cultivation under Different Bamboo Biochar Application Levels. Korea Journal of Environmental Agriculture Conference; http://www.papersearch.net/view/detail.asp?detail-key=09202621

Pommier, Thomas; Asmaa Merroune, Yvan Bettarel, Patrice Got, Jean-Louis Janeau, Pascal Jouquet, Thuy Doan Thu, Tran Duc Toan and Emma Rochelle-Newall (2014). Off-site impacts of agricultural composting: role of terrestrially derived organic matter in structuring aquatic microbial communities and their metabolic potential. FEMS Microbiology Ecology; DOI 10.1111/1574-6941.12421

Preston, Reg; Lylian Rodríguez (2014). Food and Energy Production from Biomass in an Integrated Farming System. Sustainable Agriculture Reviews; DOI 10.1007/978-3-319-06016-3_2

Qing, Hou; Zhao Lixin; Meng Haibo; Chen Yujun; Cheng Hongsheng (2014). Biochar and humic acid on pig manure composting passivation effect of heavy metals. Agricultural Engineering; http://www.tcsae.org/nygcxb/ch/reader/view abstract.aspx?file no=20141126

QiuTong, Xu; Qiu ZhiTeng; Zhang MingKui (2014). Effects of biochar application on transformation and chemical forms of C, N and P in soils with different pH. Journal of Zhejiang University (Agriculture and Life Sciences)

Qiuxiang, He; Chen Zuliang (2014). Characterization and kinetics of biochar prepared from pomelo peel for adsorption of phenol. Chinese Journal of Environmental Engineering; http://www.cjee.ac.cn/teepc_cn/ch/reader/view_abstract.aspx?file_no=20140953

Reverchon, Frédérique; Hong Yang, Thian Yuan Ho, Guijun Yan, Jian Wang, Zhihong Xu, Chengrong Chen, Dongke Zhang (2014). A preliminary assessment of the potential of using an acacia—biochar system for spent mine site rehabilitation. Environmental Science and Pollution Research; DOI 10.1007/s11356-014-3451-1

Saini, Anita; Neeraj K Aggarwal, Anuja Sharma, Manpreet Kaur and Anita Yadav (2014). Utility potential of Parthenium hysterophorus for its strategic management. Thesis: Kurukshetra University, Department of Microbiology

Sanyang, Lamin; Wan Azlina Wan Ab Karim Ghani, Azni Idris, Mansor Bin Ahmad (2014). Zinc Removal from Wastewater Using Hydrogel Modified Biochar. Materials Science and Engineering

oai.bham.ac.uk/ws/files/17537447/Wood Steam gasification rapeseed wood sewage sludge Biomass Bioenergy 2014.pdf

Sharma, Abhishek (2014). Multi-scale modelling of biomass pyrolysis process. Thesis: Curtin University, Faculty of Science and Engineering, Department of Chemical Engineering; http://espace.library.curtin.edu.au/R?func=dbin-jump-full&object_id=200511

Shi, Kaiqi; Wu, Tao; Yan, Jiefeng; Zhao, Haitao; Lester, Edward (2014). Microwave enhanced pyrolysis of gumwood. Materials for Renewable Energy and Environment (ICMREE); DOI 10.1109/ICMREE.2013.6893653

Sidibe, Modibo (2014). Comparative study of bark, bio-char, activated charcoal filters for upgrading greywater. Student Project: Soil and Water Management; http://stud.epsilon.slu.se/6760

Singla, Ankit; Suresh Kumar Dubey, Alpana Singh, Kazuyuki Inubushi (2014). Effect of biogas digested slurry-based biochar on methane flux and methanogenic archaeal diversity in paddy soil. Agriculture, Ecosystems & Environment; DOI 10.1016/j.agee.2014.08.010

Stewart, Matthew (2014). Removal of Organic and Inorganic Contaminants from Oil Sands Tailings using Carbon Based Adsorbents and Native Sediment. Thesis: University of Alberta, Geoenvironmental Engineering; https://era.library.ualberta.ca/public/view/item/uuid:11771ad2-e7a0-45d2-8f71-6f2991cbc949/DS1/Stewart_Matthew_Fall%202013.pdf

Taha, Sherif M.; Mohamed E. Amer, Ashraf E. Elmarsafy, Mohamed Y. Elkady (2014). Adsorption of 15 different pesticides on untreated and phosphoric acid treated biochar and charcoal from water. Journal of Environmental Chemical Engineering; DOI 10.1016/j.jece.2014.09.001

Ting-Ting Qian, De-Chang Li, and Hong Jiang (2014). Thermochemical Behavior of Tris(2-Butoxyethyl) Phosphate (TBEP) during Co-pyrolysis with Biomass. Environmental Science & Technology; DOI 10.1021/es502669s

Trakal, Lukáš; Deniz Bingöl, Michael Pohorelý, Miroslav Hruška, Michael Komárek (2014). Geochemical and spectroscopic investigations of Cd and Pb sorption mechanisms on contrasting biochars: Engineering implications. Bioresource Technology; DOI 10.1016/j.biortech.2014.08.108

Vanek, Steven J.; Johannes Lehmann (2014). Phosphorus availability to beans via interactions between mycorrhizas and biochar. Plant and Soil; DOI 10.1007/s11104-014-2246-y

Vithanage, Meththika; Anushka Upamali Rajapaksha, Ming Zhang, Sören Thiele-Bruhn, Sang Soo Lee, Yong Sik Ok (2014). Acid-activated biochar increased sulfamethazine retention in soils. Environmental Science and Pollution Research; DOI 10.1007/s11356-014-3434-2

Vu, Quynh Duong; Andreas de Neergaard, Toan Duc Tran, Huong Thi Thu Hoang, Van Thi Khanh Vu, Lars Stoumann Jensen (2014). Greenhouse gas emissions from passive composting of manure and digestate with crop residues and biochar on small-scale livestock farms in Vietnam. Environmental Technology; http://www.tandfonline.com/doi/abs/10.1080/09593330.2014.960475#.VBErhaOAIXQ

Wang Z, Guo H, Shen F, Yang G, Zhang Y, Zeng Y, Wang L, Xiao H, Deng S (2014). Biochar produced from oak sawdust by Lanthanum (La)-involved pyrolysis for adsorption of ammonium (NH4(+)), nitrate (NO3(-)), and phosphate (PO4(3-)). Chemosphere; DOI 10.1016/j.chemosphere.2014.07.084

Windeatt, Jayne H.; Andrew B. Ross, Paul T. Williams, Piers M. Forster, Mohamad A. Nahil, Surjit Singh (2014). Characteristics of biochars from crop residues: Potential for carbon sequestration and soil amendment. Journal of Environmental Management; DOI 10.1016/j.jenvman.2014.08.003

Woo Seung Han (2014). Biochar for soil carbon sequestration. Clean Technology; DOI 10.7464/ksct.2013.19.3.201

Xiaohui, Wang (2014). Effect of biochar on soil cultivation facilities nitrification and denitrification microbial communities. Australia Joint Laboratory of Soil Environment; http://ir.rcees.ac.cn/handle/311016/7674

Xie, Qinglong; Peng Peng, Shiyu Liu, Min Min, Yanling Cheng, Yiqin Wan, Yun Li, Xiangyang Lin, Yuhuan Liu, Paul Chen, Roger Ruan (2014). Fast microwave-assisted catalytic pyrolysis of sewage sludge for bio-oil production. Bioresource Technology; DOI 10.1016/j.biortech.2014.09.006

Xu, Xiaoyun; Xinde Cao, Ling Zhao, Haojun Zhou and Qishi Luo (2014). Interaction of organic and inorganic fractions of biochar with Pb(II) ion: Further elucidation of mechanisms for Pb(II) removal by biochar. RSC Advances; DOI 10.1039/C4RA07303G

Xu, Yiliang; Baoliang Chen (2014). Organic carbon and inorganic silicon speciation in rice-bran-derived biochars affect its capacity to adsorb cadmium in solution. Journal of Soils and Sediments; DOI 10.1007/s11368-014-0969-2

Yamauchi, Shigeru; Takayuki Yamagishi, Kazuko Kirikoshi, Mitsuyoshi Yatagai (2014). Cesium adsorption from aqueous solutions onto Japanese oak charcoal I: effects of the presence of group 1 and 2 metal ions. Journal of Wood Science; DOI 10.1007/s10086-014-1431-1

Yì, qí guó; Zhang Yongguang, Qi Fangjie, Xiao Bo, Li Fanghua (2014). Woody biomass fuel combustion and its semi-coke mixed experimental study: Experimental studies on co-firing lignocellulosic biomass with biochar. Environmental Sciences;

http://www.actasc.cn/hjkxxb/ch/reader/view_abstract.aspx?file_no=20140127002

Zhai, Limei; Zhuoma CaiJi, Jian Liu, Hongyuan Wang, Tianzhi Ren, Xiapu Gai, Bin Xi, Hongbin Liu (2014). Short-term effects of maize residue biochar on phosphorus availability in two soils with different phosphorus sorption capacities. Biology and Fertility of Soils; DOI 10.1007/s00374-014-0954-3

Zhang, H.; R. P. Voroney, and G. W. Price (2014). Effects of biochar amendments on soil microbial biomass and activity. Journal of Environmental Quality

Zhang, Lu; Xiangyang Sun (2014). Changes in physical, chemical, and microbiological properties during the two-stage co-composting of green waste with spent mushroom compost and biochar. Bioresource Technology; DOI 10.1016/j.biortech.2014.08.079

Zhang, Meng; Liang Shu, Xiaofang Shen, Xiaoying Guo, Shu Tao, Baoshan Xing, Xilong Wang (2014). Characterization of nitrogen-rich biomaterial-derived biochars and their sorption for aromatic compounds. Environmental Pollution; DOI 10.1016/j.envpol.2014.08.018

Zhou, ZaoHong; Juhong Yuan and Mianhao Hu (2014). Adsorption of ammonium from aqueous solutions on environmentally friendly barbecue bamboo charcoal: Characteristics and kinetic and thermodynamic studies. Environmental Progress & Sustainable Energy; DOI 10.1002/ep.12036