



## May 2013 News from the International Biochar Initiative

### [IBI to Launch the \*IBI Biochar Certification Program\*: Participate in Webinars to Learn More](#)

Following publication of the *IBI Standardized Product Definition and Product Testing Guidelines for Biochar That Is Used in Soil*, also known as the *IBI Biochar Standards*, the International Biochar Initiative will soon launch its *IBI Biochar Certification Program*. The *IBI Biochar Certification Program* is a voluntary certification program for biochar manufacturers.

As part of the Program launch, IBI is hosting two webinars in the next two weeks to review details of the Program. We invite you to join a webinar to learn about the program, participation requirements, and what it means to carry the IBI Certified Biochar Seal on your biochar(s). Webinar participants will learn about the overall IBI biochar certification process for manufacturers and be able to ask questions regarding the *IBI Biochar Certification Program*. The webinars are free and open to IBI Members and the general public. The schedule and registration links for the webinars are included below.

If you wish to send questions in advance of the webinar, please address them to [Certification@biochar-international.org](mailto:Certification@biochar-international.org)

#### ***IBI Biochar Certification Program* Informational Webinar Schedule:**

(To find the correct time and date in your area, we recommend that you use a time converter such as the one found at <http://www.timeanddate.com/>)

Webinar 1: May 29, 2013 at 10:00p.m. EDT (which is 10 o'clock in the evening in New York City, USA).

Space is limited. Reserve your webinar seat now at: <https://www3.gotomeeting.com/register/245210238>

Webinar 2: June 3, 2013 at 10:00a.m. EDT (which is 10 o'clock in the morning in New York City, USA).

Space is limited. Reserve your webinar seat now at: <https://www3.gotomeeting.com/register/190930694>

Once you are registered for the webinar, the Go To Webinar system will send you a reminder email with the time given in your time zone (which is based on where your computer was located when you registered, so if you have traveled, you may need to re-check this). Also, make sure that your email program will accept emails from the Go To Webinar system.

### [Biochar Carbon Offset Protocol Development Update](#)

Along with projects partners The Climate Trust and The Prasino Group, IBI has received a first round of comments on the Quantification Methodology for Biochar Projects (aka the Biochar Carbon Offset Protocol), recently submitted for validation at the American Carbon Registry (ACR)—a leading carbon offset program. The methodology—designed to credit biochar projects

seeking to participate in voluntary carbon markets—quantifies the stable carbon component of biochar, defined as carbon expected to remain in soil 100 years after biochar application, as well as the avoided emissions from feedstock combustion and decomposition.

Based on feedback from ACR, the protocol project team is working on revisions to the methodology; pending completion of the revisions and acceptance by ACR, the methodology will then be shared publicly for a 4-week public comment period. During that time, ACR will also offer a stakeholder consultation webinar to solicit additional public input. The project team will respond to public comments in a further revision of the document, and this version will then undergo at least two rounds of comment-and-response by a scientific peer review panel convened by ACR. Upon completion of peer review, the final methodology will be published on ACR's website and will be available for use by project proponents.

In the coming weeks, IBI will announce the public comment period and the ACR webinar, and will circulate the draft methodology through our website, press releases, and selected mailings.

## [Call to Participate in IBI Public Survey on Global Biochar Projects](#)

IBI's public survey to gather data on biochar project activity will remain open until June 3<sup>rd</sup>. Please click here to participate (link to: <http://www.surveygizmo.com/s3/1247459/Biochar-Projects-Survey>). The survey is designed to gather information that will be used to document trends, opportunities, and barriers in the deployment of biochar systems across the globe. In particular, the survey explores economic considerations to identify patterns in financing, revenue generation, and livelihood creation. The data collected will be shared with the global biochar community in aggregated form. Please note that IBI will not release any personal or confidential information or identify specific individuals or organizations in the survey results (other than project website, location, etc.) nor will we share the specifics of financial or economic data connected to any project. Please take ten minutes to complete the survey (link to: <http://www.surveygizmo.com/s3/1247459/Biochar-Projects-Survey>)—the more responses we receive, the more comprehensive a picture of current biochar projects trends and opportunities that we will be able to provide to our members and the global biochar community.

## [IBI Response to Recent Study on Black Carbon Dissolution in Soils and Transport to Oceans](#)

A study published in the April 19, 2013 issue of Science magazine titled “Global Charcoal Mobilization from Soils via Dissolution and Riverine Transport to the Oceans” examined the proportion of benzene polycarboxylic acids (BPCA) as a proxy for black (pyrogenic) carbon (BC) in dissolved organic carbon (DOC) of a number of rivers. While the paper makes an important contribution to the global knowledge base on DOC fluxes in the environment, IBI believes there are a number of clarifications needed to reduce the propagation of erroneous conclusions about biochar behavior in soil.

We concur with the finding that the export of BC to terrestrial ecosystems via rivers is significant. This should not be interpreted, however, as being greater than the export of uncharred material. In fact, the export of BC is only 10% of the total export of organic carbon, which is on the same order of magnitude or even smaller than the proportions that the authors cite for BC contents in soils of 5-40%. Therefore, BC in soil is not preferentially exported from watersheds.

Based on citations the authors conclude that production rates of BC exceed decomposition rates and thus “a relatively labile BC pool must exist, allowing for considerable losses from soils.” However, the studies cited acknowledge high uncertainty in the rates of BC production, and, in the case of BC degradation, do not support inferences about BC degradation via microbial metabolism—rather just total losses from soil, be it via erosion, leaching or mineralization. Based on uncertainty in both production and decomposition of BC, we believe that further research is warranted to understand BC fluxes in the environment.

Finally, the article concludes by implying that use of biochar may reduce DOC bioavailability with cascading effects on microbial and aquatic food webs. This, however, would only be correct if all biochar were made from biomass where the baseline scenario is accumulation in soil. In fact, most biochar proponents—including IBI—advocate for use of biomass feedstocks that are currently burnt, land filled or disposed of in ways other than returning them to soils. Furthermore, even aggressive scenarios of biochar addition would still only be a fraction of total annual biomass residues that are already returned to soils and the impact on DOC bioavailability would thus be small.

## IBI Designates Bari Italy as 2013 International Biochar Conference

The IBI Board has designated the upcoming International Conference (BCD2013) entitled “Biochars, Composts and Digestates. Production, Characterization, Regulation, Marketing, Uses and Environmental Impact” as the IBI 2013 International Biochar Conference. BCD2013 will be held in Bari, Italy, from 17 to 20 October 2013, presided by Prof. Nicola Senesi of the University of Bari.

The Conference will focus on the various scientific and applied aspects of biochar, compost and digestate sciences and technologies, including field approaches and implications in a sustainable environment. BCD2013 will have four general sessions and a number of special sessions. We invite you to submit abstracts for presentations now at the conference website (link to: [www.bcd2013.eu](http://www.bcd2013.eu)). Abstract submissions are due June 30, 2013.

## Business and Organization Member Updates

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 Organization Member: NC Farm Center for Innovation and Sustainability**

The North Carolina Farm Center for Innovation and Sustainability (NCFCIS) was founded in 2008 with the intention of linking the legacy of conservation to the innovation and sustainability of the future.



In 2009 the NCFCIS received a 3 year USDA NRCS Conservation Innovation Grant to test agricultural biochar as a soil amendment on typical eastern NC crops. The trial also included a field test of a portable biochar unit.

The increase in crop production (corn, wheat, cotton and soybeans) has led the Center to encourage further trials in other soil types and more research of biochar in agriculture. A complete report on this extensive study as well as recommendations going forward for additional research is posted on the NCFCIS website.

The NCFCIS biochar trials were conducted on Privateer Farm, a 6000 acre former commercial turkey, meat goat, and row crop operation that is presently involved in a 3400 acre stream and wetland restoration project. Other sustainable practices on the farm have included solar drip irrigation and innovative rain water catchment and containment. For more information, please see: [www.ncfarmcenter.org](http://www.ncfarmcenter.org).

## Biochar Briefs: News Roundup for May

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

### **Australia**

Dr Adrian Morphet is working in Western New South Wales with his mobile biochar unit, the Charmaker, to deal with weeds in river ways such as willows. Traditionally, woody weeds have been bulldozed into a heap and burned and instead, the Charmaker transforms them into biochar. (link to: <http://www.abc.net.au/rural/telegraph/content/2013/s3763926.htm>).

### **Austria**

The first FOREBIOM workshop was organized back-to-back with the European Geosciences Union General Assembly in April with the aim of assessing the potential of biochar production for energy and subsequently as an soil amendment to improve soil properties. Full presentations are available online. (link to: <http://www.oeaw.ac.at/forebiom/conference.htm>).

### **Norway**

Gerard Cornelissen at Norwegian Geotechnical Institute (NGI) and University of Life Sciences (UMB) received a US\$1.5M personal research stipend (2013-2017) through the Norwegian Research Council for biochar research in Indonesia, Zambia and Nepal. Research will be mechanistic, and topics will include 1) biochar effects on soil fertility; 2) biochar effects on GHG emissions; 3) biochar effects on pollutant immobilization. (link to: <http://www.ngi.no/en/Project-pages/Biochar/Norway-and-abroad/>).

### **Switzerland**

Switzerland has become the first country in Europe to officially approve the use of certified biochar in agriculture, with the Federal Ministry of Agriculture issuing its approval on 23 April 2013. The Delinat Institute has been given responsibility for controlling biochar quality and the sustainability of its production within the context of this program. (link to: <http://www.ithaka-journal.net/schweiz-bewilligt-pflanzenkohle-zur-bodenverb...> and also link to: <http://www.schweizerbauer.ch/pflanzen/ackerbau/blw-gibt-gruenes-licht--pflanzenkohle-vorerst-frei-einsetzbar-10391.html>).

### **United States**

Employees with Iowa State University's Armstrong Research and Demonstration Farm/ ISU Extension and Outreach are in the field, working the land and helping farmers. These researchers are working with farmers to look at the potential benefit biochar can bring to local farmlands. (link to: <http://www.omaha.com/article/20130521/NEWS/705219920/1707>).

## Report from the Recent International Biomass Expo

IBI intern Krish Homagain recently participated on the 6th International Biomass Conference and Expo on April 8-10, 2013, at the Minneapolis Convention Center in Minnesota (United States) and focused on how the emerging biochar field can learn from the larger biomass industry in terms of industry expos. There were about 200 displays from all sectors of the world's interconnected biomass utilization industries—bio-based power, thermal energy, fuels and chemicals etc.

The event featured about 30 panel discussions and more than 100 speakers, including 90 technical presentations and 30 poster presentations on topics ranging from anaerobic digestion and gasification to pyrolysis and combined heat and power, all within the framework of four customized tracks. There were pre-and post-conference tours to the 100MW Biomass-to-Energy facility (Koda Energy and Great River Energy) and to the District Energy of St. Paul and Target Energy Field, home of Minnesota Twins. These tours offered participants a firsthand insight into how biomass to energy operates successfully within their respective margins.

Among the papers and discussions of biochar related topics, Dr. Kent Hoekman, Research Professor of Desert Research Institute of USA, presented a paper on 'Hydrochar as dense energy and biofuel'; Dr. Doug Tiffany (UMD) and Nathan Anderson (USFS) presented an assessment of technical and financial aspects of biochar production along with torrefaction and other biomass utilization. Mr. Homagain presented a paper on "Environmental Impacts of Biochar-based Bioenergy in Ontario, Canada".

## Opportunities in Biochar

- Submit an Abstract to the Biochar Symposium at SETAC North America 34th Annual Meeting: **due May 28**. For more information: <http://www.biochar-international.org/node/4095>.
- Call for Applications for Momentum for Change: Financing for Climate-Friendly Investment: **closing May 31**. For more information: <http://www.biochar-international.org/node/4116>.
- Submit an Abstract to the International Conference BCD2013 "Biochars, Composts and Digestates. Production, Characterization, Regulation, Marketing, Uses and Environmental Impact": **due June 30**. For more information: [www.bcd2013.eu](http://www.bcd2013.eu).
- Submit an Abstract to the 2013 Geological Society of America's Annual Meeting: **due August 6**. For more information: <http://www.biochar-international.org/node/4129>.
- Submit an Expression of Interest for the Second International Biochar Training Course at Nanjing Agricultural University (NJAU), planned for October, 2013. For more information: <http://www.biochar-international.org/node/3845>.

New job postings at: <http://www.biochar-international.org/network/jobs>.

## Upcoming Calendar Events

- June 3 – 7: 21st European Biomass Conference and Exhibition. Location: Copenhagen, Denmark. For more information: <http://www.biochar-international.org/node/3778>.
- June 14: Midwest Biochar Conference. Location: Champaign, IL, US. For more information: <http://www.biochar-international.org/node/3897>.
- June 21 – 22: British Biochar 2013: Sustainable use and production of biochar in the UK. Location: University of Oxford, UK. For more information: <http://www.biochar-international.org/node/3901>.
- July 4 – 5: New Zealand Biochar 2013. Location: Palmerston North, New Zealand. For more information: <http://www.biochar-international.org/node/3746>.
- September 1 – 13: GEPP Executive Summer School on Global Environmental Policy. Location: Geneva, Switzerland. For more information: <http://www.biochar-international.org/node/3780>.
- September 23 – 25: 3rd Annual World Congress of Agriculture 2013. Location: Hangzhou, China. For more information: <http://www.biochar-international.org/node/3995>.

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

## Regional Biochar Group Updates

To read more on the 52 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 Indonesian Biochar Association (IBA) and the Pioneer Valley Biochar Initiative (PVBI), based in the United States.

### **Indonesian Biochar Association (IBA)**

In order to establish cooperation with the biochar association in Japan, Dr. Nursyamsi (Vice Chairman of International Cooperation IBA) worked with Prof. Mitsuru Osaki, PhD (Leader of JST-JICA Project on "Wild Fire and Carbon Management in Peat-Forest in Indonesia" from Hokkaido University). The IBA and the Japanese Biochar Association are collaborating moving forward by sharing information on their projects and membership lists and activities. For more information, please see: <http://www.biochar-international.org/regional/Indonesia>.

### **Pioneer Valley Biochar Initiative (PVBI), United States**

The University of Massachusetts has signed on as a Premier Sponsor of the 2013 USBI North American Biochar Symposium (to be held October 13 – 16, 2013). 2013 marks the sesquicentennial, or 150th anniversary, of the Stockbridge School of Agriculture at the University of Massachusetts. As such, Provost James Staros and Dean Stephen Herbert are supporting important agricultural research and developments like the symposium.

"Two components of this symposium have far reaching potential that we hope will resonate both with the regional and national stakeholder communities as well as the leadership at UMass: namely, the first Carbon Negative conference and the planned Biochar Banquet showcasing UMass permaculture, world class dining services as well as the sesquicentennial anniversary of the Stockbridge School of Agriculture," says conference director, Karen Ribeiro.

"With food security being one of the most critical concerns of our time, expanding the long-term agricultural, soil and wastewater remediation, and carbon-negative benefits of biochar is of utmost importance", says PVBI chair Ted Wycsocki. For more detail about this conference, visit [www.symposium2013.pvbiochar.org](http://www.symposium2013.pvbiochar.org)

In addition to organizing the symposium, PVBI has been active in the following over the last month:

- Participated in the *Grow It Westhampton BBQ*—and held a Biochar Demonstration (camp fire method) and picnic with 40 people in attendance.
- Dr. John Olver (former MA Representative in the US House of Representatives) attended a recent PVBI meeting as a guest. Dr. Alan Page is conducting a biochar Forestry study on Dr. Olver's land, and an outdoor demonstration of the Power Pallet using wood pellets to provide heat, electricity and biochar.
- Held the final session of the UMASS-Amherst biochar seminar with demonstrations for making biochar.
- Participated in the Amherst Sustainability Festival with a biochar booth and the Grow Food Amherst Meet and Greet.
- Met with experts on numerous topics around biochar such as using biochar infiltrated with catalysts to capture Arsenic in Bangladesh ground water; and the use of biochar/humic acid for radio-isotope capture at Fukushima Japan to minimize transfer to food crops.
- Met with Congressman James P. McGovern who is interested in working on biochar in agriculture. Congressman McGovern will be the keynote speaker in the 2013 USBI North American Biochar Symposium.



## Recently Published Biochar Research

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

Abel, Stefan; Andre Peters; Steffen Trinks; Horst Schonsky; Michael Facklam; Gerd Wessolek (2013). Impact of biochar and hydrochar addition on water retention and water repellency of sandy soil. *Geoderma*. Volumes 202–203, Pages 183–191.

Almaroai, Yaser A.; Adel R. A. Usman; Mahtab Ahmad; Deok Hyun Moon; Ju-Sik Cho; Young Kyoo Joo; Choong Jeon; Sang Soo Lee; Yong Sik Ok (2013). Effects of biochar, cow bone, and eggshell on Pb availability to maize in contaminated soil irrigated with saline water. *Environmental Earth Sciences*.

Ameloot Nele; De Neve Stefaan; Jegajeevagan Kanagaratnam; Yildiz Güray; Buchan David; Nkwain Funkuin Yvonne; Prins Wolter; Bouckaert Liesbeth; Sleutel Steven (2013). Short-term CO<sub>2</sub> and N<sub>2</sub>O emissions and microbial properties of biochar amended sandy loam soils. *Soil biology & biochemistry*. vol. 57, pp. 401-410.

Angst, Teri E.; Colin J. Patterson; David S. Reay; Peter Anderson; Tanya A. Peshkur; and Saran P. Sohi (2013). Biochar Diminishes Nitrous Oxide and Nitrate Leaching from Diverse Nutrient Sources. *Journal of Environmental Quality*.

Bai, Mo; Burkhard Wilske; Franz Buegger; Jürgen Esperschütz; Claudia Irene Kammann; Christian Eckhardt; Martin Koestler; Philipp Kraft; Martin Bach; Hans-Georg Frede; Lutz Breuer (2013). Degradation kinetics of biochar from pyrolysis and hydrothermal carbonization in temperate soils. *Plant and Soil*.

Carter, Sarah; Simon Shackley; Saran Sohi; Tan Boun Suy; and Stephan Haefele (2013). The Impact of Biochar Application on Soil Properties and Plant Growth of Pot Grown Lettuce (*Lactuca sativa*) and Cabbage (*Brassica chinensis*). *Agronomy*. 404-418.

Cayuela, Maria Luz; Miguel Angel Sánchez-Monedero; Asunción Roig; Kelly Hanley; Akio Enders; and Johannes Lehmann (2013). Biochar and denitrification in soils: when, how much and why does biochar reduce N<sub>2</sub>O emissions? *Sci Rep*. 2013; 3: 1732; <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3635057/>.

Fall, Abibatou Banda (2012). The Biochar: an alternative energy for the development of the Sahel countries. Doctorate student at the Geography Department at University Gaston Berger, in Saint-louis, Senegal. *Ci. & Tróp. Recife*, v.36, n. 1, p.73-92; <http://periodicos.fundaj.gov.br/index.php/CIT/article/viewFile/1489/1305>

Farrell, Mark; Thomas K. Kuhn; Lynne M. Macdonald; Todd M. Maddern; Daniel V. Murphy; Phillip A. Hall; Bhupinder Pal Singh; Karen Baumann; Evelyn S. Krull; Jeff A. Baldock (2013). Microbial utilisation of biochar-derived carbon. *Science of The Total Environment*.

Hamaguchi, Marcelo; Jussi Saari; Esa Vakkilainen (2013). Biochar and Bio-oil as Additional Revenue Streams in South American Kraft Pulp Mills. *Bioresources.com*; <http://ojs.cnr.ncsu.edu/index.php/BioRes/article/viewFile/3737/2143>.

Houben, David; Laurent Evrard; Philippe Sonnet (2013). Mobility, bioavailability and pH-dependent leaching of cadmium, zinc and lead in a contaminated soil amended with biochar. *Chemosphere*.

Liao, Rui; Bin Gao; June Fang (2013). Invasive plants as feedstock for biochar and bioenergy production. *Bioresource Technology*.

Liu, Zhaoyun; Walelign Demisie; Mingkui Zhang (2013). Simulated degradation of biochar and its potential environmental implications. *Environmental Pollution*. Volume 179, Pages 146–152.

Marchetti, Rosa and Fabio Castelli (2013). Biochar from Swine Solids and Digestate Influence Nutrient Dynamics and Carbon Dioxide Release in Soil. *Journal of Environmental Quality*.

Martindale, Amanda; Dorottya Spolarics; Julianne Decker; Marlee Najamy Winnick (2013). Construction and Implementation of a Pyrolysis Unit for the Production of Biochar in a Sustainable Greenhouse Heating System. Integrated Science and Technology (ISAT) majors at James Madison University led by Dr. Wayne Teel;  
<https://valley25x25.org/sites/default/files/IMCE/pdf/Greenhouse-Heat-BioChar-Report.pdf>

Naisse, Christophe; Marie Alexis; Alain Plante; Katja Wiedner; Bruno Glaser; Alessandro Pozzi; Christopher Carcaillet; Irene Criscuoli; Cornélia Rumpel (2013). Can biochar and hydrochar stability be assessed with chemical methods? *Organic Geochemistry*.

Nguyen, Dai Huong, Biala, Johannes, Grace, Peter R., Scheer, Clemens, Rowlings, David W. (2013) Effects of rice husk biochar and sugar-mill by-products on methane consumption from two different soils. In Bruce, Robin (Ed.) *Proc Aust Soc Sugar Cane Technol*, Townsville, Australia, pp. 1-8; [http://eprints.qut.edu.au/58496/1/M\\_05\\_Nguyen\\_et\\_al.pdf](http://eprints.qut.edu.au/58496/1/M_05_Nguyen_et_al.pdf).

Özçimen, Didem (2013). An Approach to the Characterization of Biochar and Bio-Oil. Bioengineering Department Yildiz Technical University, Turkey.

Saleh, Maher E.; Amal H. Mahmoud; and Mohamed Rashad (2013). Biochar Usage as a Cost-Effective Bio-Sorbent for Removing NH<sub>4</sub>-N from Wastewater;  
<http://gccbs2013.aast.edu/newgcc/images/pdf/biochar%20usage%20as%20a%20cost-effective%20bio-sorbent%20for%20removing%20nh4-n%20from%20wastewater%20maher%20e.%20saleh%20amal%20h.%20mahmoud%20and%20mohamed%20rashad.pdf>.

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<http://www.scielo.br/pdf/bgoeldi/v8n1/v8n1a02.pdf>.

Schulz, Hardy; Gerald Dunst; Bruno Glaser (2013). Positive effects of composted biochar on plant growth and soil fertility. *Agronomy for Sustainable Development*.

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Swanson, John (2013). Climate-Change Mitigation Potential of Biochar: A Review and Framework for Carbon Accounting. Masters project submitted in partial fulfillment of the requirements for the Duke Environmental Leadership Master of Environmental Management degree in the Nicholas School of the Environment;  
<http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/6842/Swanson%20MP%20Biochar%20final.pdf?sequence=1>.

Wang, Dengjun; Wei Zhang; and Dongmei Zhou (2013). Antagonistic Effects of Humic Acid and Iron Oxyhydroxide Grain-Coating on Biochar Nanoparticle Transport in Saturated Sand. *Environ. Sci. Technol.*

Xie, Mengxing; Dan Lv; Xin Shi; Yuqiu Wan; Wei Chen; Jingdong Mao; Dongqiang Zhu (2013). Sorption of Monoaromatic Compounds to Heated and Unheated Coals, Humic Acid, and Biochar:



Implication for Using Combustion Method to Quantify Sorption Contribution of Carbonaceous Geosorbents in Soil. *Applied Geochemistry*.

Yang, Y.; X. Lin; B. Wei; Y. Zhao; J. Wang (2013). Evaluation of adsorption potential of bamboo biochar for metal-complex dye: equilibrium, kinetics and artificial neural network modeling. *International Journal of Environmental Science and Technology*.

Yang Zhi-Hui, Xiong Shan, Wang Bing, Li Qian, Yang Wei-Chun (2013). Cr(III) adsorption by sugarcane pulp residue and biochar. Springer Press.  
[http://edu.zndxzk.com.cn/download/2013/05\\_znen/24-p1319-e122108.pdf](http://edu.zndxzk.com.cn/download/2013/05_znen/24-p1319-e122108.pdf).

Zhang, Afeng; Rongjun Bian; Qaiser Hussain; Lianqing Li; Gengxing Pan; Jinwei Zheng; Xuhui Zhang; Jufeng Zheng (2013). Change in net global warming potential of a rice–wheat cropping system with biochar soil amendment in a rice paddy from China. *Agriculture, Ecosystems & Environment*. Volume 173, Pages 37–45.

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