



February 2013 News from the International Biochar Initiative

IBI Board Welcomes Two New Members

The IBI Board is pleased to announce the addition of two new board members: John Lewis and Andreas Hornung. Both join the IBI board for three year terms. We also wish to thank departing board member Dr. Yoshiyuki Shinogi of Kyushu University in Japan for all his work over the past three years.

Dr. Andreas Hornung is the director of the European Bioenergy Research Institute (EBRI) at Aston University in the UK and is the Director of the Institute Sulzbach-Rosenberg of Fraunhofer Institute for Environmental, Safety, and Energy Technology (UMSICHT). With a team of researchers at EBRI, Dr. Hornung developed a biochar production system called the Pyroformer™ which utilizes multiple waste feedstocks to generate cost-effective heat and power. Dr Hornung is a Fellow of the Royal Society of Chemistry and of the Institution of Chemical Engineers.

Dr. John Lewis is currently the Managing Director of Terra Global Capital, LLC, which provides organizations with strategic advice in environmental markets. Dr. Lewis has 29 years of experience combining his discipline, ecological anthropology, with international development management experience. By 2001, he had completed a 22-year career with USAID, retiring after six years as the Agency Senior Agriculturalist and Director of its central Office of Agriculture and Food Security. From that Senior Foreign Service vantage point, Dr. Lewis brought several international agribusiness corporations to collaborate with USAID field programs. Serving in Senegal, Mali, Cameroon, Egypt, Tunisia, and then Haiti, Dr. Lewis was able to design and implement path-breaking new approaches to community-driven sustainable development in rural settings. Immediately following his retirement from the Agency, he became Executive Director of the Near East Foundation. Since 2002, he has served as Executive Director of ProNatura USA. Dr. Lewis has a Ph.D. in anthropology from Yale University.

We look forward to working with both Dr. Hornung and Dr. Lewis and further introducing them to our community. For more information on these new members and our existing board members, please see: <http://www.biochar-international.org/board/advisorycommittee>.

Industry Updates: Introducing IBI's New Interns

Thank you to all those who applied for the IBI Industry Intern Position. We had such excellent candidates that we decided to create two intern positions—one focusing on tracking and cataloging industry/commercial information and the other tracking and cataloging biochar project information; both at the international level. Please feel free to [contact us](#) if you have a company or

project that you would like included in our database. We'll be reaching out to the wider biochar community through announcements, surveys, newsletter updates, and information requests to help us compile this information. In the meantime, please meet our two new interns. Welcome!

Biochar Project Intern, Elaine Doyle

Ms. Elaine Doyle is based in Ireland and has a BE in Manufacturing Engineering from University of Limerick as well as a post-graduate Diploma in Management Practices and an MSc in Sustainable Development both from Dublin Institute of Technology. She has worked in the areas of engineering and education all under the heading of sustainability. Additionally, Ms. Doyle has worked as an engineer in a waste management company and wind farm development company and as an educational facilitator with the Sustainable Energy Authority of Ireland. She is currently self-employed, and runs a sustainable education company dealing with environmental education, engineering, community and development. One of her aims is to bring biochar to community and school gardens. Ms. Doyle was one of the finalists in the recent (August 2012) Ben & Jerry's Join Our Core social enterprise competition in Uganda where she pitched a biochar in schools project.

Biochar Industry Intern, Krish Homagain

Mr. Krish Homagain is a professional forester and environmental practitioner currently pursuing a PhD degree in Forest Sciences at Lakehead University, Canada. Born and raised in Nepal, Mr. Homagain has a Forestry Diploma, a B.Sc. Forestry, a B.Ed. and M.Sc. Forestry degree, as well as 14 years of extensive work experience in natural resources management and research. He is currently involved in researching and writing a project on "Environmental Impacts of Biochar-Based Bioenergy in Northwestern Ontario". Mr. Homagain has published a series of peer reviewed journal papers in a book on "Sustainability of Community Forestry in Nepal". His specializations include life cycle assessments, boreal vegetation management, economic analysis, project management, spreadsheet modeling, dendrochronology, environmental impact assessment, and community forestry.

IBI Biochar Certification Program Announcements

IBI has just completed a successful second legal review of the IBI Biochar Certification Program materials. In the coming weeks, another round of editorial updates will take place as well as completion of internal testing of the program's online forms and materials.

Significant updates to the program's format include opening the initial phase of implementation to biochar manufacturers from Canada. IBI intends to expand the program to other countries in subsequent phases and as resources permit, but the initial launch will be limited to applicants from the United States and Canada.

In the lead-up to the official launch of the IBI Biochar Certification Program this spring, IBI will conduct in-depth webinars to educate stakeholders about the certification program and its requirements, and to answer any questions that producers or potential participants may have. Be looking for additional announcements and a schedule of webinars, to be announced in the coming weeks. For questions or further inquiries regarding the IBI Biochar Certification Program, please contact us at certification@biochar-international.org.

Biochar Carbon Market Offset Protocol Development

The Biochar Carbon Offset Protocol being developed with our project partners The Climate Trust and The Prasino Group is rapidly nearing completion, and will be submitted to the American Carbon Registry (ACR) in early March for review and approval. Once submitted to the ACR, the protocol will undergo internal technical review for completeness, and pending any revisions, the complete protocol will be posted for public comment in April. ACR will coordinate and host a public webinar to review the protocol with all stakeholders in the biochar and carbon market community. IBI will widely circulate the draft protocol when it is available, and will advertise the ACR webinars through our website, press releases, and selected mailings. After the public comment period, the protocol will undergo an additional scientific peer review according to established ACR protocols.

The protocol includes a new standard test methodology for measuring the stable carbon component of biochar, defined as biochar that will remain in soil 100 years after its application. The test methodology was developed by an Expert Panel established and led by IBI, and we would like to take this opportunity to thank Miguel Rodríguez for all his work leading the Expert Panel on behalf of IBI as well as the work of the members of the expert panel for their dedication and contributions to this effort. For questions or comments on the Biochar Carbon Market Offset Protocol effort, please contact IBI at biocharprotocol@biochar-international.org.

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 a membership or to join, please see: <http://www.biochar-international.org/join>. Please note, Business and Organization descriptions are submitted by each individual entity, and are not developed or written by IBI.

New Business Member

FLORENTAISE

FLORENTAISE was founded in 1973 and is the French leader in substrates and mulches with 100 employees, 7 manufacturing plants in



France, and a turnover of \$40M. FLORENTAISE has a strong international presence with HORTIFIBRE, a sustainable wood fiber manufactured by the company and incorporated in consumer and professional substrates, particularly in Europe and the US. Launching sustainable products for plants' culture, food and health is part of the FLORENTAISE strategic approach.

FLORENTAISE produces and distributes its own biochar branded as Greenchar. Greenchar is the result of green waste pyrolysis and acts as a catalyst for fertilizers and as a soil improver. The manufacturing process locks the green waste carbon within the material and makes it a highly sustainable product with a negative carbon impact. Greenchar mixed within a qualitative substrate can increase crop yields for many years. For more information, contact Jean-Pascal Chupin, jean-pascal.chupin@florentaise.com, +33 2 40 77 44 44, www.florentaise.com.

Renewing Business or Organization Members:

We are very pleased to announce membership renewals from the following business and organization members. As renewing Business or Organization members, we thank you for your

continued support of IBI and our mission and goals on behalf of the international biochar community.

Arizona Public Service Company (APS)

Arizona Public Service Company (APS) is Arizona's largest and longest serving electric utility company, providing power to more than one million customers in 11 of the state's 15 counties. Since its founding in



1886, APS has demonstrated a strong commitment to its customers in one of the country's fastest growing states, earning a reputation for achieving customer satisfaction, contributing shareholder value, striving for operational excellence and exhibiting business integrity. The APS Vision is centered on 'Creating a Sustainable Energy Future for Arizona.' APS has about 7,100 employees and operates the second largest generation fleet in the western United States. In addition to nuclear and fossil generation, APS explores the use of solar and other renewable generation technology.

For more information, please see www.aps.com or contact Timothy McDonald at timothy.mcdonald@aps.com.

Micromeritics Analytical Services

Micromeritics Analytical Services is a contract lab service organization specializing in biochar material characterization services. We specifically provide testing for BET surface area, pore size analysis, CO₂ adsorption, butane adsorption, bulk density, particle density, and particle size analysis on a variety of biochar and carbon related materials. Our parent company is Micromeritics Instrument Corporation. Founded in 1962, Micromeritics is a leading supplier of materials characterization analytical laboratory instrumentation. The company manufactures a broad line of automated laboratory instruments that measure physical characteristics of powders and solids for fundamental research, product development, quality assurance and control, production, and process control applications.



For more information on the company, please see: <http://www.particletesting.com> or email mas@particletesting.com.

The Prasino Group

The Prasino Group is a network of leading advisors in carbon strategy, management, accounting and project development. We aim to penetrate markets for biochar by expanding in different regions of the US & Canada; use pilot projects as a low risk, low cost approach to produce biochar to support market development; develop commercial scale operations and feedstock supply lines; and test different types of feedstock to assess the relationship between feedstock, operating parameters and biochar performance in local markets. The Prasino Group works at three levels of project development from \$50 - \$500k for developing world projects to medium-quality biochar (\$250K - \$1M), to highest quality biochar; higher feedstock costs (\$1M minimum). The Prasino group is partnering with The Biochar Company and Biochar LLC and is



working with pilot projects in Alberta (Canada) and Hawaii (United States).

For more information, please see: www.prasinogroup.com or contact info@prasinogroup.com.

The Waste Management Association of Australia (WMAA)

The WMAA is Australia's leading Association for waste management and resource recovery industry businesses and professionals. Established in 1991, WMAA is an independent, not for profit, representative body for professionals and businesses in the waste management and resource recovery sector, with in excess of 1,000 members including individuals, corporate, local and state government, consultants, and academics. WMAA's vision is to achieve sustainable resource management and mission is to advance waste management, to improve resource recovery, and to make a difference through knowledge, leadership, and collaboration.



WMAA plays a proactive role in developing and promoting improved industry standards for the waste management and resource recovery industry. The Association provides a forum for debate on issues regarding waste management and resource recovery by delivering conferences and seminars for knowledge transfer, education and information exchange, and networking for its members and other stakeholders. WMAA also plays a role in advocacy for its special interest groups and works closely with government in the development of policies aimed to improve resource recovery and support the waste management industry. WMAA is also engaged in data collection for various sectors of its membership.

For more information, please visit www.wmaa.asn.au or contact Veronica Dullens at Veroncia@wmaa.asn.au.

Profile: Measuring Progress on Biochar Stoves in North Viet Nam

One of the challenges posed to rural biochar stove projects can be monitoring and evaluation of not only the stoves themselves, but continued use of the stoves and the effectiveness of the biochar produced as a soil amendment. A group of stove experts and researchers working with CARE Viet Nam have been working with villagers to examine how to improve soil health while reducing the amount of indoor and outdoor pollution from smoke utilizing improved cookstoves that produce biochar. [IBI reported in early 2012 on earlier stages of this project](#)



based in two mountainous provinces in northern Viet Nam, Thai Nguyen and Thanh Hoa. The staple food crop in the area is rice and the farmers use the straw for animal feed and for fuel. Most of the stubble is burnt in spring although some farmers burn during the winter. The burning emits a large amount of smoke; a small amount of biochar and ash are also produced, which remains in the field.

The initial project report highlighted work done in villages with biochar stoves and initial field trials. Based on user feedback from the first batch of 50 stoves, new models were modified and tested,

resulting in the production and distribution of a further 400 stoves by the women's group members. To evaluate the impact of the stoves on households, the project team performed a series of tests on the original stoves, and based on those, worked with the local community to update the stove design to further reduce emissions, reduce fuelwood consumption, increase stove life expectancy, improve ease of use, and make it more cost-effective for households. One of the project partners, the Population, Environment and Development Centre (PED), developed a number of innovative sheet metal working machines to help mass produce the stoves. To read the remainder of this profile, please see: http://www.biochar-international.org/profile/Vietnam_Stoves_2013.

Photo: Testing the stoves; courtesy of Stephen Joseph

Biochar Briefs: News Roundup for February

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

Canada

[The 11th annual GLOBE Awards for Environmental Excellence](#) awarded Diacarbon Energy Inc. the Award for Excellence in Emerging Technology for its continuous process thermal biomass refinery (TBR) technology which will also produce biochar.

[The Labrador Institute of Memorial University is working on biochar research](#) in the Happy Valley-Goose Bay to improve the area's agricultural capabilities—currently, there are constraints due to frost, low soil organic matter, sandy soil texture and low soil fertility.

Costa Rica/Kenya

[National Geographic's Great Energy Challenge Initiative funded two biochar cookstove projects](#)—one in Kenya and the other in Costa Rica providing cleaner indoor air and biochar for local gardens. National Geographic presents some interesting results from this work to date.

India

[The Indian Institute of Technology \(IIT\) in Punjab has invented a bio-oil generation plant](#) to utilize straw in fields and decrease the practice of open air biomass burning. The plant will also produce biochar for use in fields; IIT has already seen good results from their biochar field trials.

Rwanda

[Radio Lifeline is a US based non-profit that is launching a new initiative, the Black Earth Project](#), with re:char. The Black Earth Project is a two-year research project designed to evaluate the effectiveness of biochar when used as a soil amendment by smallholder coffee and pyrethrum farmers in Rwanda.

Senegal

[Mr. Jörg Fingas is working in Senegal with communities to distribute ovens](#) which utilize pellets pressed from a reed-like plant which spread after the construction of a dam on the Senegal River. The ovens reduce the use of fuel wood for cooking and produce biochar which is being tested on 7000 hectares of a rice farm in northern Senegal.

United States

[A new report by the Stanford University Global Climate and Energy Project \(GCEP\)](#) examines different carbon-negative technologies that could remove large amounts of CO₂ from the atmosphere. Biochar is included as one of the technologies.

Opportunities in Biochar

- Submit a Speaker Interest Form for the Biochar Session at the Biomass Asia Conference 2013 in Kuala Lumpur, Malaysia. For more information: <http://www.biochar-international.org/node/3929>.
- Become a sponsor for the 2013 North American Biochar Symposium planned for October 13 - 16, 2013 or submit an abstract. For more information: <http://symposium2013.pvbiochar.org>.
- 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>.
- Submit an Abstract for the 1st FOREBIOM Biochar Workshop in Vienna, Austria. Deadline, March 18, 2013. For more information: <http://www.biochar-international.org/node/3933>.
- Get a free subscription to Biomass Magazine: more information at: <http://www.biochar-international.org/node/3797>.
- Download an Open Source ebook: Understanding Stoves For Environment and Humanity by Dr. N. Sai Bhaskar Reddy published by MetaMeta, The Netherlands. For more information see: <http://www.biochar-international.org/node/3690>.
- New job postings at: <http://www.biochar-international.org/network/jobs>.

Upcoming Calendar Events

- April 4 – 5: 1st FOREBIOM Biochar Workshop. Location: Vienna, Austria. For more information: <http://www.biochar-international.org/node/3933>.
 - March 18 – 22, 2013: Global Alliance for Clean Cookstove Clean Cooking Forum 2013: Igniting Change, Fueling Markets & Sparking Adoption. Location: Phnom Penh, Cambodia. For more information: <http://www.biochar-international.org/node/3886>.
 - March 19 – 20, 2013: 2-day seminar on the Commercialization of Sustainable Biochar. Location: Hotel Equatorial Bangi, Malaysia. For more information: <http://www.biochar-international.org/node/3895>.
 - April 5: Illinois Biochar Group Spring Meeting. Location: Urbana-Champaign, IL, USA. For more information: <http://www.biochar-international.org/node/3896>.
 - April 6: Florida Biochar Regional Meeting. Location: Melbourne, FL, USA. For more information: <http://www.facebook.com/pages/Florida-biochar/438352616184448>.
 - April 7 – 12, 2013: Biochar for soil remediation and global warming mitigation at EGU 2013. Location: Vienna, Austria. For more information: <http://www.biochar-international.org/node/3849>.
 - April 8 – 10, 2013: International Biomass Conference and Expo. Location: Minneapolis, MN, USA. For more information: <http://www.biochar-international.org/node/3685>.
 - April 17 – 18, 2013: National Conference on Philippine Biochar. Location: Quezon City, The Philippines. For more information: <http://www.biochar-international.org/node/3853>.
 - April 20 – 21: Biochar Workshop on Caring for the Earth: Farmers and Gardeners Leading the Way. Location: Elmore, Australia. For more information: <http://www.biochar-international.org/node/3853>.
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[international.org/node/3931](http://www.biochar-international.org/node/3931).

- May 5 – 8: Biochar: Waste to Wealth; a Special Session on Biochar. Location: Hong Kong. For more information: <http://www.biochar-international.org/node/3822>.
- May 13 – 14, 2013: WATER, FORESTS, AND PEOPLE: Innovations for a Sustainable Water Future. Location: Beijing, China. For more information: <http://www.biochar-international.org/node/3803>.
- May 20 – 22: Biochar Session at Biomass Asia 2013. Location: Kuala Lumpur, Malaysia. For more information: <http://www.biochar-international.org/node/3929>.

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

Regional Biochar Group Updates

To read more on the 52 regional and national biochar groups, [please see IBI's website](#). This month includes updates from the Illinois Biochar Group (United States), the Pioneer Valley Biochar Initiative (United States), and the Biochar Association of Indonesia.

Illinois Biochar Group (United States)

The Illinois Biochar Group will hold its spring meeting on Friday, April 5, at the Illinois Sustainable Technology Center (ISTC) on the campus of the University of Illinois at Urbana-Champaign. The meeting will be held from 1:15 to 3 pm CST with biochar research/project updates given by IBG members and there will also be discussion about the upcoming Midwest Biochar Conference that IBG is helping to organize. Prior to the meeting, there will be a seminar from noon - 1 pm CST given by Dr. Sandeep Agnihotri of ISTC on "Porosity of Biochar". This seminar will be broadcast live and also archived on the [ISTC website](#) and [IBG website](#) for later viewing. If you cannot attend the event at ISTC, you may view the webinar live by registering at: <https://www4.gotomeeting.com/register/124000839>. Attendance for seminar and meeting is free and open to the public.

The Illinois Biochar Group, in conjunction with the Illinois Sustainable Technology Center at the University of Illinois and the U.S. Department of Agriculture as co-organizers, announces the first Midwest Biochar Conference which will be held on June 14, 2013, in Champaign, IL. The conference will feature presentations on the latest in biochar research, exhibit space for vendors, and plenty of opportunities for discussion with those interested in all aspects of biochar work. The event will take place at the I-Hotel Conference Center from 8:00 am to 4:30 pm CST, with a reception following from 4:30 - 6:00 pm. Abstract submission opened Feb. 11, 2013. Conference registration will open approximately May 1, 2013. Plan to register early as space will be limited. Please watch the IBG website at www.biochar.illinois.edu for more information. For questions, please contact IBG coordinator Nancy Holm at naholm@illinois.edu.

Pioneer Valley Biochar Initiative (PVBI, United States)

PVBI is organizing the 2013 USBI North American Biochar Symposium at UMass Amherst. This biochar symposium is designed for farmers, foresters, researchers, policymakers, biochar producers and entrepreneurs, and especially students and citizens who want to learn more about biochar as an alternative to fossil fuel-based fertilizers/pesticides and energy. The conference organizers announce a call for papers due March 4, 2013. There are four main tracks for speakers:

1. Feedstocks & Technology
2. Benefits of Biochar - agriculture (farm and forest) climate, water, energy
3. Scale, Sales & Marketing
4. Community Engagement and Policy

For details on each track and to submit an abstract, please see:

<http://symposium2013.pvbiochar.org/tracks>.

The Biochar Association of Indonesia

An Indonesian National Workshop on "Biochar for future food security: Learning from experiences and identifying research priorities" took place 4-5 February 2013. The workshop was held at the Food Crop Center of Agricultural Research & Development Agency, on Jalan Merdeka Bogor. For more information, please see: http://www.biochar-international.org/Indonesia_conference_2013.

In addition to the workshop, the Biochar Association of Indonesia (ABI) also held a meeting at the Santika Hotel, Bogor, on 4 February 2013. The ABI meeting was to elect the Chairman of the Biochar Association of Indonesia. The participants agreed to elect Prof. Dr. Ir. Wani Hadi Utomo as General Chairman and Prof. Dr. Gustan Pari, M.Si as Chairman I. Furthermore, within three months the board of management of ABI will be completed. In 2013, ABI will compose the Articles of Association and Bylaws, Main Tasks and Functions (TUPOKSI), and Work program of ABI. For more information, please see: www.biochar-international.org/regional/Indonesia.

Recently Published Biochar Research

ABI 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](#).

Al-Wabel, MI; Al-Omran A; El-Naggar AH; Nadeem M; Usman AR. (2013). Pyrolysis temperature induced changes in characteristics and chemical composition of biochar produced from conocarpus wastes. *Bioresource Technol.* 131C:374-379.

Albuquerque, José Antonio; Pablo Salazar; Vidal Barrón; José Torrent; María del Carmen del Campillo; Antonio Gallardo; Rafael Villar (2013). Enhanced wheat yield by biochar addition under different mineral fertilization levels. *Agronomy for Sustainable Development*. <http://link.springer.com/article/10.1007/s13593-012-0128-3#>.

Alho, C. F. B. V.; R. Auccaise; C. M. B. F. Maia; E. H. Novotny; R. C. C. Lelis (2013). Using Solid-State 13C NMR to Study Pyrolysis Final Temperature Effects on Biochar Stability. *Functions of Natural Organic Matter in Changing Environment*. pp 1007-1011.

Bull, Dr. Leonard (2012). A Field Demonstration for Mobile Torrefaction Technology to Produce Biochar and Evaluate Its Value to North Carolina Farmers. Conservation Innovation Grant (CIG) Final Report. Number NRCS 69-3A75-9-18; <http://www.ncfarmcenter.org/uploads/Bio%20Char%20Final%20Report.pdf>.

Deng, Guo Zhi; Xue Yuan Wang; Xian Yang Shi; Qian Qian Hong (2013). Adsorption Characteristics of Phenol in Aqueous Solution by Pinus massoniana Biochar. *Applied Mechanics and Materials*. 1154-1160.

- Ducey Thomas F.; James A. Ippolito; Keri B. Cantrell; Jeffrey M. Novak; Rodrick D. Lentz (2013). Addition of activated switchgrass biochar to an aridic subsoil increases microbial nitrogen cycling gene abundances. *Applied Soil Ecology*. Volume 65, Pages 65–72.
- Haberland, G. T.; K. C. Lombardi (2013). Organic Matter and Carbon in a Cambisol After Incorporation of Biochar for *Eucalyptus benthamii*. *Functions of Natural Organic Matter in Changing Environment*. pp 1017-1020.
- Han, Guang Ming, Jun Meng, Wei Ming Zhang, Wen Fu Chen (2013). Effect of Biochar on Microorganisms Quantity and Soil Physicochemical Property in Rhizosphere of Spinach (*Spinacia oleracea* L.). *Applied Mechanics and Materials*. 210-219.
- Khan S; Wang N; Reid BJ; Freddo A; Cai C. (2013). Reduced bioaccumulation of PAHs by *Lactuca sativa* L. grown in contaminated soil amended with sewage sludge and sewage sludge derived biochar. *Environ Pollut*.
- Kong, Huoliang; Jiao He; Jin Han; Yanzheng Gao (2013). Utilizing Stalk-Based Biochar to Control the Risk of Persistent Organic Pollutants in the Environment. *Functions of Natural Organic Matter in Changing Environment*. pp 989-991.
- Larsbo, Mats; Elisabeth Löfstrand; David van Alphen de Veer; Barbro Uléna (2013). Pesticide leaching from two Swedish topsoils of contrasting texture amended with biochar. *Journal of Contaminant Hydrology*.
- Li, Jianfa; Yimin Li; Mingjun Wu; Zheyang Zhang; Jinhong Lü (2013). Effectiveness of low-temperature biochar in controlling the release and leaching of herbicides in soil. *Plant and Soil*.
- Liu, Ning; Zhen Tao Sun; Zheng Chao Wu; Xiu Mei Zhan; Kai Zhang; En Feng Zhao; Xiao Ri Han (2013). Adsorption Characteristics of Ammonium Nitrogen by Biochar from Diverse Origins in Water. *Advanced Materials Research*. 305-312.
- Madari, B. E.; L. B. Lima; M. A. S. Silva; E. H. Novotny; F. A. Alcântara; M. T. M. Carvalho; F. A. Petter (2013). Carbon Distribution in Humic Substance Fractions Extracted from Soils Treated with Charcoal (Biochar). *Functions of Natural Organic Matter in Changing Environment*. pp 1003-1006.
- Mangrich, A. S.; L. C. Angelo; K. M. Mantovani (2013). Biochar Produced from Chemical Oxidation of Charcoal. *Functions of Natural Organic Matter in Changing Environment*. pp 997-1001.
- Milla, O.; Wang, H.; Huang, W. (2013). Feasibility Study using Municipal Solid Waste Incineration Bottom Ash and Biochar from Binary Mixtures of Organic Waste as Agronomic Materials. *J. Hazard. Toxic Radioact. Waste*.
- Milla, O. and Huang, W. (2013). Identifying the Advantages of Using MSW Bottom Ash in Combination with Rice Husk and Bamboo Biochar Mixtures as Soil Modifiers: Enhancement of the Release of Polyphenols from a Carbon Matrix. *J. Hazard. Toxic Radioact. Waste*.
- Mukome, Fungai N.D.; Xiaoming Zhang; Lucas C.R. Silva; Johan Six; Sanjai J. Parikh (2013). Use of chemical and physical characteristics to investigate trends in biochar feedstocks. *J. Agric. Food Chem*.
- Novotny, E. H.; R. Auccaise; L. B. Lima; B. E. Madari (2013). Characterisation of Humic Substances Extracted from Soil Treated with Charcoal (Biochar). *Functions of Natural Organic Matter in Changing Environment*. pp 971-974.

Prabha, Shanthi; Renuka R; Sreekanth N.P; Babu Padmakumar; A.P Thomas (2013). A Study of the Fertility and Carbon Sequestration Potential of Rice Soil with Respect to the Application of Biochar and Selected Amendments. *Annals of Environmental Science*, Vol 7, 17-30.

Qian, Linbo; Baoliang Chen; Dingfei Hu (2013). Effective Alleviation of Aluminum Phytotoxicity by Manure-derived Biochar. *Environ. Sci. Technol.*

Shen, Jianlin; Hong Tang; Jiyeun Liu; Yong Li; Tida Ge; Jinshui Wu (2013). A Comparison of Greenhouse Gas Emissions from a Paddy Field Following Incorporation of Rice Straw and Straw-Based Biochar. *Functions of Natural Organic Matter in Changing Environment*. pp 1027-1031.

Singla, Ankit; Kazuyuki Inubushi (2013). Effect of biochar on CH₄ and N₂O emission from soils vegetated with paddy. *Paddy and Water Environment*.

Söderberg, Camilla (2013). Effects of biochar amendment in soils from Kisumu, Kenya. Thesis for Degree Program in Biology at Swedish University of Agricultural Sciences;
http://stud.epsilon.slu.se/5218/1/soderberg_c_130124.pdf.

Teel, Wayne S. (2012). Capturing Heat from a Batch Biochar Production System for Use in Greenhouses and Hoop Houses. *Journal of Agricultural Science and Technology A* 2. 1332-1343;
<http://www.davidpublishing.com/davidpublishing/Upfile/1/15/2013/2013011573763825.pdf>.

Troy, Shane M.; Peadar G. Lawlor; Cornelius J. O'Flynn; Mark G. Healy (2013). Impact of biochar addition to soil on greenhouse gas emissions following pig manure application. *Soil Biology and Biochemistry*.

Tu, Qiaoping; Weixiang Wu; HaoHao Lu; Bin sun; Cheng Wang; Hui deng; Yingxu Chen (2013). The Effect of Biochar and Bacterium Agent on Humification During Swine Manure Composting. *Functions of Natural Organic Matter in Changing Environment*. pp 1021-1025.

Wei LL; G Xu; Hong-Bo Shao; JN Sun; SX Chan (2013). Regulating environmental factors of nutrients release from wheat straw biochar for sustainable agriculture. *CLEAN – Soil, Air, Water*.

Wijayanta, Agung Tri; Md. Saiful Alam; Koichi Nakaso; Jun Fukai; Kazuya Kunitomo; Masakata Shimizu (2013). Combustibility of biochar injected into the raceway of a blast furnace. *Fuel Processing Technology*.

Xu, G; L.L. Wei; J.N. Sun; H.B. Shao; S.X. Chang (2013). What is more important for enhancing nutrient bioavailability with biochar application into a sandy soil: Direct or indirect mechanism? *Ecological Engineering*. Volume 52, Pages 119–124.

Zhang Zhi-Xia; Yan Weng; Jun Meng; Wen-Fu Chen; Ji-Ping Gao (2012). A Biochar Manufacturing Furnace Based on Laboratory Studies. *Journal of Advanced Manufacturing Systems*. Volume 11, Issue 02.