

Biochar For Environmental Management Science Technology And Implementation

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Biochar -- Prof. Johannes Lehman, Cornell University *Biochar For Environmental Management Science*

BIOCHAR FOR ENVIRONMENTAL MANAGEMENT: SCIENCE AND TECHNOLOGY. This all encompassing book on biochar, Biochar for Environmental Management, is edited by IBI Board members Johannes Lehmann and Stephen Joseph. The volume explores a diverse set of aspects needed to advance the application of biochar for environmental management. Authors with expertise in the basic sciences as well as economics, marketing and policy summarize our current knowledge and provide a roadmap for future research and ...

BIOCHAR FOR ENVIRONMENTAL MANAGEMENT: SCIENCE AND ...

Biochar is the carbon-rich product which occurs when biomass (such as wood, manure or crop residues) is heated in a closed container with little or no available air. It can be used to improve agriculture and the environment in several ways, and its persistence in soil and nutrient-retention properties make it an ideal soil amendment to increase crop yields.

Biochar for Environmental Management | Science, Technology ...

In combination with sustainable biomass production, such a biochar sequestration can be carbon negative and therefore be used to actively remove carbon dioxide from the atmosphere, with obvious significance for mitigation of climate change. Biochar production can also be combined with bioenergy production through the use of the gases that are given off in the pyrolysis process.

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Science, Technology and Implementation 1. Biochar for Environmental Management: An Introduction Johannes Lehmann and Stephen Joseph 2. Traditional Use of Biochar Katja Wiedner and Bruno Glaser 3. Fundamentals of Biochar Production Robert Brown, Bernardo del Campo, Akwasi A. Boateng, Manuel ...

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Biochar is the carbon-rich product when biomass (such as wood, manure or crop residues) is heated in a closed container with little or no available air. It can be used to improve agriculture and the environment in several ways, and its stability in soil and superior nutrient-retention properties make it an ideal soil amendment to increase crop yields.

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In terms of market development, if biochar can be used as a soil amendment to improve soil quality and to increase crop production, this will increase its appeal (Day et al, 2004). In this regard, an obvious positive attribute of biochar is its nutrient value, supplied either directly by providing nutrients to plants or indirectly by improving soil quality, with consequent improvement in the efficiency of fertilizer use.

Biochar for Environmental Management - Taylor & Francis

Such a use of biochar is a significant advance over conventional organic matter management, as the biochar is more stable in soil and is better able to retain nutrients. In combination with sustainable biomass production, such a biochar sequestration can be carbon negative and therefore be used to actively remove carbon dioxide from the atmosphere, with obvious significance for mitigation of climate change.

Biochar for Environmental Management: Science and ...

Biochar for Environmental Management: Science, Technology and Implementation 2nd Edition. Biochar for Environmental Management: Science, Technology and Implementation. 2nd Edition. by Johannes Lehmann (Editor), Stephen Joseph (Editor) 5.0 out of 5 stars 8 ratings. ISBN-13: 978-0415704151.

Biochar for Environmental Management: Science, Technology ...

Biochar terminology The origin of biochar management and research The big picture Adoption of biochar for environmental management Physical Properties of Biochar Adriana Downie, Alan Crosky and Paul Munroe Introduction Biochars: Old and new Relevance of extended literature Caution on comparing data Origin of biochar structure Influence of molecular structure on biochar morphology Loss of structural complexity during pyrolysis Industrial processes for altering the physical structure of ...

Biochar for environmental management: science and ...

The book's interdisciplinary approach, which covers engineering, environmental sciences, agricultural sciences, economics and policy, is a vital tool at this stage of biochar technology development. This comprehensive overview of current knowledge will be of interest to advanced students, researchers and professionals in a wide range of disciplines"--Provided by publisher.

Biochar for Environmental Management: Science and ...

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Applying biochar to forest soils along with natural or synthetic fertilizers has been found to increase the bioavailability and plant uptake of phosphorus (P), alkaline metals and some trace metals (Glaser et al, 2002; Lehmann et al, 2003; Steiner et al, 2007), but the mechanisms for these increases are still a matter of speculation.

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Biochar is the carbon-rich product which occurs when biomass (such as wood, manure or crop residues) is heated in a closed container with little or no available air. It can be used to improve agriculture and the environment in several ways, and its persistence in soil and nutrient-retention properties make it an ideal soil amendment to increase crop yields. In addition to this, biochar sequestration, in combination with sustainable biomass production, can be carbon-negative and therefore used to actively remove carbon dioxide from the atmosphere, with potentially major implications for mitigation of climate change. Biochar production can also be combined with bioenergy production through the use of the gases that are given off in the pyrolysis process. The first edition of this book, published in 2009, was the definitive work reviewing the expanding research literature on this topic. Since then, the rate of research activity has increased at least ten-fold, and biochar products are now commercially available as soil amendments. This second edition includes not only substantially updated chapters, but also additional chapters: on environmental risk assessment; on new uses of biochar in composting and potting mixes; a new and controversial field of studying the effects of biochar on soil carbon cycles; on traditional use with very recent discoveries that biochar was used not only in the Amazon but also in Africa and Asia; on changes in water availability and soil water dynamics; and on sustainability and certification. The book therefore continues to represent the most comprehensive compilation of current knowledge on all aspects of biochar.

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carbon-negative and therefore used to actively remove carbon dioxide from the atmosphere, with major implications for mitigation of climate change. Biochar production can also be combined with bioenergy production through the use of the gases that are given off in the pyrolysis process. This book is the first to synthesize the expanding research literature on this topic. The book's interdisciplinary approach, which covers engineering, environmental sciences, agricultural sciences, economics and policy, is a vital tool at this stage of biochar technology development. This comprehensive overview of current knowledge will be of interest to advanced students, researchers and professionals in a wide range of disciplines.

Biochar: Fundamentals and Applications in Environmental Science and Remediation Technologies, Volume Six provides readers with the fundamentals of scientific and technological aspects of biochar application in stormwater treatment, its use in contaminant removal, greenhouse gas mitigation, as landfill cover material, and new environmental and agronomic applications. Chapters in this new release cover Biochar application for soil remediation in a redox-sensitive environment, Remediation of heavy metal contaminated soil: Role of biochar, Role of biochar as a cover material in Landfill waste disposal system- Perspective from Unsaturated soil mechanics, Biochar in soil re-engineering, Green remediation of contaminated agricultural land using biochar, and more. Additional chapters cover the Impact of biochars on redox processes in soils, Biochar for manipulation of manure properties, A relationship paradigm between biochar amendments and green house gas emissions, Biochar amalgamation with clay: Enhanced performance for environmental remediation, Functionalization of biochar using microbial consortia, and the Potential role of biochar to mitigate the negative impacts of climate change on water quality. Provides up to-date information on the use of biochar for contaminant remediation, as landfill cover material, and as a tool for energy transition Includes the aspect of biochar's use in mitigating impacts of climate change and how manure properties can be altered through biochar addition Covers the role of microbial consortia on biochar functionalization

Biochar from Biomass and Waste: Fundamentals and Applications provides the fundamentals of biochar, such as its basic concepts, production technology and characterization methods, also including comprehensive examples for readers. This book includes information on state-of-art biochar application technologies in the fields of agriculture, energy and environmental sciences with step-by-step case studies. Biochar has received worldwide interests in the past decade because it encompasses high priority research areas, including bioenergy production, global warming mitigation and sustainable agriculture. Offers comprehensive coverage of biochar production, characterization and modification methods Provides global case studies covering a wide range of application fields, including environmental, agricultural, syngas and bio-oil Covers the sustainability and future of biochar

Agricultural and Environmental Applications of Biochar: Advances and Barriers: Over the past decade, biochar has been intensively studied by agricultural and environmental scientists and applied as a soil quality enhancer and environmental ameliorator in various trials worldwide. This book, with 21 chapters by 57 accomplished international researchers, reports on the recent advances of biochar research and the global status of biochar application. Scientific findings, uncertainties, and barriers to practice of biochar amendment for sustaining soil fertility, improving crop production, promoting animal performance, remediating water and land, and mitigating greenhouse gas emissions are synthesized. The book presents a whole picture of biochar in its production, characterization, application, and development. Agricultural and Environmental Applications of Biochar: Advances and Barrier highlights the mechanisms and processes of biochar amendment for achieving stunning agricultural and environmental benefits. Composition and characteristics of biochar, its interactions with contaminants and soil constituents, and its transformation in the environment are illustrated to enlighten the achievements of biochar amendment in improving soil physical, chemical, and biological quality and animal health, reducing soil greenhouse gas emissions, and decontaminating stormwater and mine sites. Additional emphasis is given to the pyrogenic carbon in Terra Preta soils and Japanese Andosols, the pyrolysis technology for converting agricultural byproducts to biochar, and the existing economic and technical barriers to wide application of biochar in Australia, China, New Zealand, North America, and Europe. Readers will appreciate the comprehensive review on the up-to-date biochar research and application and gain critical guidance in best biochar generation and utilization.

Biochar is a carbon-rich material produced from the pyrolysis of organic materials from agricultural and forestry biomass at a relatively low temperature in the absence of oxygen. As such, it has potential for solving many agricultural and environmental problems. This book is divided into five sections: "Introduction," "Production and Legislation of Biochar," "Applications of Biochar for Soil Fertility Improvement," "Role of Biochar for Soil Remediation and Ameliorating Salinity Effects" and "Applications of Biochar for Water Treatment." Chapters address topics such as the pros and cons of biochar, its production, and its role in remediating and treating contaminated soils and water.

This book provides up-to-date information on biochar use in management of soil health, agriculture productivity, green-house gases, restoration ecology and environment. Biochar application to nutrient deficient and disturbed soils is a viable option which may promotes advances in food safety and food security to human nutrition and overall fundamental research in the agricultural sciences. The book describes in detail how the recalcitrant biochar is able to persist for long periods of time and work as a shelter for soil microbial colonisation and their biomass/numbers. This book also includes contents related to important role of biochar applications in the restoration of contaminated agricultural soils. The book will be of particular interest to students, teachers and researchers in the disciplines.

This user-friendly book introduces biochar to potential users in the professional sphere. It de-mystifies the scientific, engineering and managerial issues surrounding biochar for the benefit of audiences including policy makers, landowners and farmers, land use, agricultural and environmental managers and consultants, industry and lobby groups and NGOs. The book reviews state-of-the-art knowledge in an approachable way for the non-scientist, covering all aspects of biochar production, soil science, agriculture, environmental impacts, economics, law and regulation and climate change policy. Chapters provide 'hands-on' practical information, including how to evaluate biochar and understand what it is doing when added to the soil, how to combine biochar with other soil amendments (such as manure and composts) to achieve desired outcomes, and how to ensure safe and effective use. The authors also present research findings from the first coordinated European biochar field trial and summarize European field trial data. Explanatory boxes, infographics and concise summaries of key concepts are included throughout to make the subject more understandable and approachable.

Interest in biochar among soil and environment researchers has increased dramatically over the past decade. Biochar initially attracted attention for its potential to improve soil fertility and to uncouple the carbon cycle, by storing carbon from the atmosphere in a form that can remain stable for hundreds to thousands of years. Later it was found that biochar had applications in environmental and water science, mining, microbial ecology and other fields. Beneficial effects of biochar and its environmental applications cannot be fully realised unless the chemical, physical, structural and surface properties of biochar are known. Currently many of the analytical procedures used for biochar analysis are not well defined, which makes it difficult to choose the right biochar for an intended use and to compare the existing data for biochars. Also, in some instances the use of inappropriate procedures has led to

erroneous or inaccurate values for biochars in the scientific literature. Biochar: A Guide to Analytical Methods fills this gap and provides procedures and guidelines for routine and advanced characterisation of biochars. Written by experts, each chapter provides background to a technique or procedure, a stepwise guide to analyses, and includes data for biochars made from a range of feedstocks common to all presented methods. Discussion about the unique features, advantages and disadvantages of a particular technique is an explicit focus of this handbook for biochar analyses. Biochar is primarily intended for researchers, postgraduate students and practitioners who require knowledge of biochar properties. It will also serve as an important resource for researchers, industry and regulatory agencies dealing with biochar.

This book has included the following major sections: "Introduction", "History of Biochar," "Preparation of Biochar," and "Applications of Biochar." The editor and authors hope that the development of biochar can cross its application field from agriculture into engineering.

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