Rice Straw Management International Plant Nutrition

Hydraulic Conductivity
Rice
Volume 5 – Forestry, wetlands, urban soils: Practices overview
Paper - Agricultural Economics Department, International Rice Research Institute
Management of Biological Nitrogen Fixation for the Development of More Productive and Sustainable Agricultural Systems
Managing the Environmental Footprint
Nitrogen Economy of Flooded Rice Soils
Proceedings of the International Symposium Held at the University of Dundee, Scotland, UK on 9-11 September 2003
A Global Perspective
Rice is Life Scientific Perspectives for the 21st Century
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Soil Fertility Improvement and Integrated Nutrient

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Salt Stress, Microbes, and Plant Interactions: Mechanisms and Molecular Approaches
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International Conference on Frontiers of Energy, Environmental Materials and Civil Engineering (FEEMCE 2013)
Methods for Measuring Greenhouse Gas Balances and Evaluating Mitigation Options in Smallholder Agriculture
Greenhouse Gas Footprint of Organic Amendments and Water Management in Rice Cropping Systems in Southeast Asia
International Conference on Environmental Awareness for Sustainable Development in conjunction with International Conference on Challenge and Opportunities Sustainable Environmental Development, ICEASD & ICCOSED 2019, 1-2 April 2019, Kendari, Indonesia
Climate-Smart Food
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Resources Use Efficiency in Agriculture
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The Indian Nitrogen Assessment
Blessings from Nature and Science for the Future
Rice

LARSEN CONRAD

Hydraulic Conductivity

Int. Rice Res. Inst.

This open access book on straw management aims to provide a wide array of options for rice straw management that are potentially more sustainable, environmental, and profitable compared to current practice. The book is authored by expert researchers, engineers and innovators working on a range of straw management options with case studies from Vietnam, the Philippines and Cambodia. The book is written for engineers and researchers in order to provide them information on current good practice and the gaps and constraints that require further research and innovation.

The book is also aimed at extension workers and farmers to help them decide on the best alternative straw management options in their area by presenting both the technological options as well as the value chains and business models required to make them work. The book will also be useful for policy makers, required by public opinion to reduce greenhouse gas emissions and air pollution, looking for research-based evidence to guide the policies they develop and implement. **Rice** Springer Advances in Agronomy continues to be recognized as a leading reference and a first-rate source for the latest research in agronomy. As always, the subjects covered are varied and exemplary of the myriad of subject matter dealt with by this long-running serial. * Maintains the highest impact factor among serial publications in agriculture * Presents timely reviews on important agronomy issues * Enjoys a long-standing reputation for excellence in the field *Volume 5 – Forestry, wetlands, urban soils: Practices overview* DEStech Publications, Inc
The Indian Nitrogen Assessment: Sources of Reactive Nitrogen, Environmental

and Climate Effects, and Management Options and Policies provides a reference for anyone interested in Reactive N, from researchers and students, to environmental managers. Although the main processes that affect the N cycle are well known, this book is focused on the causes and effects of disruption in the N cycle, specifically in India. The book helps readers gain a precise understanding of the scale of nitrogen use, misuse, and release through various agricultural, industrial, vehicular, and other activities, also including discussions on its contribution to the pollution of water and air. Drawing upon the collective work of the Indian Nitrogen Group, this reference book helps solve the challenges associated with providing reliable estimates of nitrogen transfers within different ecosystems, also presenting the next steps that should be taken in the development of balanced, cost-effective, and feasible strategies to reduce the amount of reactive nitrogen. Identifies all significant sources of reactive nitrogen flows and their contribution to the nitrogen-cycle on a national, regional, and

global level Covers nitrogen management across sectors, including the environment, food security, energy, and health Provides a single reference on reactive nitrogen in India to help in a number of activities, including the evaluation, analysis, synthesis, documentation, and communications on reactive nitrogen *Paper - Agricultural Economics Department, International Rice Research Institute* Springer Science & Business Media Agroecosystems of South India is a unique treatise that deals with the relevance of natural resources, genetic stocks, fertilizers, and agronomic practices on the productivity of agroecoregions. Within the context of this book, an agroecosystem has been defined as a conglomerate of small cropping zones, which may be mono-cropping expanses or intercrops that occur in various geographic regions of South India. South India abounds with several such agroecosystems that encompass field crops, vegetables, cash crops, plantations, and forest species. However, the main emphasis within this volume is restricted to agroecosystems that include major

cereals, legumes, and oil seed crops. There are 10 chapters in this volume. The first, on historical aspects, traces important events related to domestication, introduction of crop species, agricultural implements, development of soil fertility and crop husbandry procedures. An introductory chapter on Agroecosystems delineates various agroecoregions of South India. Their classification based on physiography, soils, and climatic parameters have been dealt with in great detail. Descriptions on natural resources such as soils and their fertility conditions; water resources; climatic conditions including precipitation patterns; and crops and their genotypes are available in chapter 2. The impact of soil fertility and nutrient dynamics on ecosystematic functions and productivity of crops in an agroecosystem forms the central piece of discussions within chapters 3 to 9. Historical background, geographical settings, agroclimate, soils, cropping systems, and productivity trends have been provided for each cropping ecosystem. Recent advances and details on aspects of nutrient dynamics, such as soil nutrients, their

availability, physico-chemical transformations, nutrient fluxes, inorganic fertilizer supply, organic manures, crop residue recycling, nutrient carry over and nutrient balances/imbalances form the core of each chapter. The impact of beneficial soil microbes such as Rhizobium, Plant Growth Promoting Rhizobacteria and Arbuscular Mycorrhizas, on nutrient dynamics in soil has also been discussed. More recent developments dealing with modeling nutrients in cropping ecosystems, computer based-simulations, precision farming and site-specific nutrient management have been emphasized. Forecasts on the impact of nutrient dynamics on the future course of agroecosystems are also available. Overall, this book is a scholarly edition that aims at providing an excellent exposition of recent developments within various agroecosystems of South India to a global audience. It highlights the importance of soil fertility and nutrient dynamics within agroecosystems to total food grain and fodder production in South India. It will be a useful book to researchers, professors, and students dealing with agriculture,

environmental science, ecology, and plant science. Management of Biological Nitrogen Fixation for the Development of More Productive and Sustainable Agricultural Systems Int. Rice Res. Inst. The key to sustaining the soil resource base is to maintain, or enhance, soil quality. Soil quality cannot be seen or measured directly from the soil alone but is inferred from soil characteristics and soil behavior under defined conditions. In essence, the quality of soils is analogous to the health of humans, and just as there is no single characteristic that can be measured to quantify a person's health, there is no single measurement that can quantify soil quality. However, there are certain characteristics , particularly when considered together, that are good indicators. Soil quality, just as human health, can be maintained or enhanced by good management practices; and seriously degraded- sometimes irrevers ibly- with poor practices. Soil quality is also important because it has direct and indirect effects on air quality and water quality. While the enhancement of soil quality does not always assure parallel improvements in the quality of air and,

particularly, water resources, this is often the case. However, soil deg radation is invariably accompanied by degraded qualities of both air and water resources. The consensus among many scientists is that the greatest challenge is not increasing production, but preventing serious deterioration of the soil and water resource base so that the production level can be sustained.

Managing the Environmental Footprint

European Alliance for Innovation

This book discusses the important issue of the socioeconomic and environmental impacts of agricultural residue burning, common in agricultural practices in many parts of the world. In particular, it focuses on the pollution caused by rice residue burning using primary survey data from Punjab, India. It discusses emerging solutions to agricultural waste burning that are cost-effective in terms of both money and time. The burning of agricultural residue causes severe pollution in land, water and air and contributes to increased ozone levels and climate change in the long term. However, appropriate assessments have not been undertaken so far to demonstrate the relevant impact of

agriculture-based pollution, especially residue burning. This book addresses this gap in the literature. Punjab has been used as a case study as it is the chief granary of India, contributing to 27.2 percent of the Indian national produce of rice and 43.8 percent of wheat. It is presumed that the findings from this state will be useful not only for other agricultural areas in India, but across the world. This book, therefore, sensitizes policy makers, researchers and students about the impacts of air pollution caused by agricultural residue burning---a subject not much dealt in the literature---and provides a way forward.

Nitrogen Economy of Flooded Rice Soils

Sustainable Rice Straw Management Soil and Fertilizers: Managing the Environmental Footprint presents strategies to improve soil health by reducing the rate of fertilizer input while maintaining high agronomic yields. It is estimated that fertilizer use supported nearly half of global births in 2008. In a context of potential food insecurity exacerbated by population growth and climate change, the importance of fertilizers in sustaining the agronomic production is clear.

However, excessive use of chemical fertilizers poses serious risks both to the environment and to human health. Highlighting a tenfold increase in global fertilizer consumption between 2002 and 2016, the book explains the effects on the quality of soil, water, air and biota from overuse of chemical fertilizers. Written by an interdisciplinary author team, this book presents methods for enhancing the efficiency of fertilizer use and outlines agricultural practices that can reduce the environmental footprint. Features: Includes a thorough literature review on the agronomic and environmental impact of fertilizer, from degradation of ecosystems to the eutrophication of drinking water Devotes specific chapters to enhancing the use efficiency and effectiveness of the fertilizers through improved formulations, time and mode of application, and the use of precision farming technology Reveals geographic variation in fertilizer consumption volume by presenting case studies for specific countries and regions, including India and Africa Discusses the pros and cons of organic vs. chemical fertilizers, innovative technologies

including nuclear energy, and the U.N.'s Sustainable Development Goals Part of the Advances in Soil Sciences series, this solutions-focused volume will appeal to soil scientists, environmental scientists and agricultural engineers. Proceedings of the International Symposium Held at the University of Dundee, Scotland, UK on 9-11 September 2003 Springer Science & Business Media - Preface - Organising Committe - Scientific and Technical Committee - Collaborating Institutions - Sponsoring Organisation With Exhibitions - Supporting Institutions - Symposium opening paper - THEME 1 Global and International Commitments - THEME 2 European Waste Directives and Priorities - THEME 3 National Government Policy - THEME 4 Local Government Policy - THEME 5 Assessing Environmental Impact - Late Papers - Index of Authors - Subject Index

A Global Perspective Elsevier Soil Fertility Improvement and Integrated Nutrient Management: A Global Perspective presents 15 invited chapters written by leading soil fertility experts. The book is organized around three themes. The first theme is Soil Mapping and Soil

Fertility Testing, describing spatial heterogeneity in soil nutrients within natural and managed ecosystems, as well as up-to-date soil testing methods and information on how soil fertility indicators respond to agricultural practices. The second theme, Organic and Inorganic Amendments for Soil Fertility Improvement, describes fertilizing materials that provide important amounts of essential nutrients for plants.The third theme, Integrated Nutrient Management Planning: Case Studies From Central Europe, South America, and Africa, highlights the principles of integrated nutrient management. Additionally, it gives case studies explaining how this approach has been implemented successfully across large geographic regions, and at local scales, to improve the productivity of staple crops and forages.

Rice is Life Scientific Perspectives for the 21st Century

Springer Nature

This open access book highlights concepts discussed at two international conferences that brought together world-renowned scientists to advance the science of potassium (K) recommendations for crops. There was general

agreement that the potassium recommendations currently in general use are oversimplified, outdated, and jeopardize soil, plant, and human health. Accordingly, this book puts forward a significantly expanded K cycle that more accurately depicts K inputs, losses and transformations in soils. This new cycle serves as both the conceptual basis for the scientific discussions in this book and a framework upon which to build future improvements. Previously used approaches are critically reviewed and assessed, not only for their relevance to future enhancements, but also for their use as metrics of sustainability. An initial effort is made to link K nutrition in crops and K nutrition in humans. The book offers an invaluable asset for graduate students, educators, industry scientists, data scientists, and advanced agronomists.

Advances in Soil Science

Springer Nature

Achieving zero hunger and food security is a top priority in the United Nations Development Goals (UNDGs). In an era characterized by high population growth and increasing pressure on agricultural systems, efficiency in the use of natural resources has become

central to sustainable agricultural practices. Fundamentally speaking, eco-efficiency is about maximizing agricultural outputs, in terms of quantity and quality, using less land, water, nutrients, energy, labor, or capital. The concept of eco-efficiency involves both the ecological and economic aspects of sustainable agriculture. It is therefore essential to understand the interaction of ecosystem constituents within the extensive agricultural landscape, as well as farmers' economic needs. This book examines the latest eco-efficient practices used in agro-systems. Drawing upon research and examples from around the world, it offers an up-to-date overview, together with insights into directly applicable approaches for poly-cropping systems and landscape-scale management to improve the stability of agricultural production systems, helping achieve food security. The book will be of interest to educators, researchers, climate change scientists, capacity builders and policymakers alike. It can also be used as additional reading material for undergraduate and graduate courses on agriculture, forestry, soil

science, and the environmental sciences.

ICEASD&ICCOSED 2019

Springer

Rice ecosystems; Nutrient management; Mineral deficiencies; Mineral toxicities; Tools and information.

Annual Report - The International Rice Research Institute

Springer Nature

During the last decades, soil organic carbon (SOC) attracted the attention of a much wider array of specialists beyond agriculture and soil science, as it was proven to be one of the most crucial components of the earth’s climate system, which has a great potential to be managed by humans. Soils as a carbon pool are one of the key factors in several Sustainable Development Goals, in particular Goal 15, “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss” with the SOC stock being explicitly cited in Indicator 15.3.1. This technical manual is the first attempt to gather, in a standardized format, the existing data on the impacts of the main soil management practices on SOC content in a wide array of environments,

including the advantages, drawbacks and constraints. This manual presents different sustainable soil management (SSM) practices at different scales and in different contexts, supported by case studies that have been shown with quantitative data to have a positive effect on SOC stocks and successful experiences of SOC sequestration in practical field applications. Volume 5 includes 24 practices that have a direct impact on SOC sequestration and maintenance in forestry, wetlands and urban soils.

Soil Fertility Improvement and Integrated Nutrient Management

Springer

This book provides standards and guidelines for quantifying greenhouse gas emissions and removals in smallholder agricultural systems and comparing options for climate change mitigation based on emission reductions and livelihood trade-offs. Globally, agriculture is directly responsible for about 11% of annual greenhouse gas (GHG) emissions and induces an additional 17% through land use change, mostly in developing countries. Farms in the developing countries of sub-Saharan Africa and Asia are predominately managed by

smallholders, with 80% of land holdings smaller than ten hectares. However, little to no information exists on greenhouse gas emissions and mitigation potentials in smallholder agriculture. Greenhouse gas measurements in agriculture are expensive, time consuming, and error prone, challenges only exacerbated by the heterogeneity of smallholder systems and landscapes. Concerns over methodological rigor, measurement costs, and the diversity of approaches, coupled with the demand for robust information suggest it is germane for the scientific community to establish standards of measurements for quantifying GHG emissions from smallholder agriculture. Standard guidelines for use by scientists, development organizations will help generate reliable data on emissions baselines and allow rigorous comparisons of mitigation options. The guidelines described in this book, developed by the CGIAR Research Program on Climate Change, Agriculture, and Food Security (CCAFS) and partners, are intended to inform anyone conducting field measurements of agricultural greenhouse gas sources

and sinks, especially to develop IPCC Tier 2 emission factors or to compare mitigation options in smallholder systems.

Salt Stress, Microbes, and Plant Interactions: Mechanisms and Molecular Approaches

Scientific Publishers - UBP

Abstract: Rice is the staple food for half the world's population. To keep up with global population growth and growing food demand, rice production will inevitably increase. Increasing water scarcity and South-east Asia's rapid economic and social development, specifically the growing demand for animal products and biofuels challenge the traditional lowland double-rice (rice-rice; [R-R]) cropping systems and has already resulted in a partial transformation to mixed lowland-upland systems. Owing to water scarcity, upland crops such as aerobic rice [R-A] or maize [R-M] are grown instead of paddy rice during the dry season (DS). Other water-saving strategies, which allow for intermitted irrigation or 'alternate-wetting and drying' (AWD) are also emerging. Such changes in water management affect C and N cycling in the soil-plant system. For instance, methane (CH4: global

warming potential (GWP) of 28) emissions from paddy fields will be replaced by emissions of the more potent greenhouse gas (GHG) nitrous oxide (N2O: GWP of 265) since methane is only produced in large amounts under anaerobic conditions and N cycling and associated release of nitrous oxide is stimulated in unsaturated soil conditions. Moreover, soil organic carbon stocks will decrease due to amplified soil respiration in presence of oxygen, thereby jeopardizing soil fertility. To counteract declining soil fertility, catch crops can be used as green manure (GM) during fallow period and rice residues can be returned with both approaches supplying and recharging organic matter, improving N retention and avoiding unproductive water losses in intensified crop rotations. Due to a lack of incentives, expensive labor and rigid cropping schedules, large amounts of rice residues are traditionally burnt after harvest and thereby adversely affect local air quality. Many Asian governments have banned open-field burning and thus are putting pressure on rice farmers to seek other ways for sustainable straw disposal.

While GM and residue returns have been shown to have a positive effect in upland soils, this approach may promote CH4 emissions from submerged, anoxic paddy soils as it provides additional substrate for methanogene sis. The management of earthworms, in turn, could restrain microbial crop residue decomposition in non-flooded rice soils and thus mitigate GHG emissions triggered by straw incorporation. Consequently, conservation practices including the management of organic amendments might be a promising approach to retain soil fertility, and sustain the productivity of emerging diversified rice rotations. However, little is known about the actual effects of such practices on soil C and N cycling and GHG balance under contrasting water management. Therefore, the major goal of my work was to i) quantify the effect of crop residue return, specifically rice straw application and legume cover crop cultivation on CH4 and N2O emissions of diversifying rice cropping systems and ii) provide a mid to long-term assessment of the annual GHG balance of diversified rice systems based on area and productivity. For this, I

calculate annual GWPs and yield-scaled GWPs of three different rice systems (R-R: rice-rice, R-A: rice-aerobic rice, R-M: rice-maize) without (control) or with additions of straw (+ 6 Mg C ha-1 [S]) or + straw + mungbean as catch crop ([M+S]) on the basis of GHG (CH4 and N2O) flux measurements in high temporal resolution, and measurements of yield parameters. The field trials were carried out at the International Rice Research Institute (IRRI), Philippines, with year-round automated chamber measurements, covering the growing season as well as off-season emissions. My investigations further explored the potential of the AWD irrigation practice and earthworm management as GHG mitigation strategies. Results from five years of continuous measurements show that maize in rotation with paddy rice has a significantly lower GWP than aerobic rice or a traditional double paddy rotation. Although dry season N2O emissions increased two- to threefold in the diversified systems (R-A, R-M), the strong reduction of CH4 emissions during this period resulted in significantly lower annual GWP as compared to the traditional double rice

system (R-R). Direct CH4 reductions during DS were complemented by overall lower CH4 emission during wet season paddy rice cultivation, which is explained by increased availability of oxidants and a delayed growth of soil methanogens. With an equivalent of 0.6 ± 0.1 Mg CO2 per ton of grain produced, the R-M system had a significantly lower annual GHG footprint than R-R with 1.4 ± 0.3 Mg CO2-eq. GY . From both a GHG perspective and productivity perspective, the performance of aerobic rice was not significantly better than paddy rice (1.2 ± 0.2 Mg CO2-eq. GY-1), mostly due to yield penalties from less intensive irrigation management during DS. This ranking persists even with the application and incorporation of rice straw and mungbean GM, however, the additional organic matter led to higher substrate availability for methanogens during the following season. Rice straw incorporation strongly stimulated CH4 emissions, but the magnitude of CH4 emissions was significantly lower under aerated soil conditions and negligible for the annual GHG balance. Likewise, the effect of GM application to CH4 emissions

during wet season paddy rice cultivation was less pronounced with maize as a preceding upland crop. However, GM application to flooded rice paddies is disqualified as sustainable management practice with CH4 emission being approximately doubled. Contrary to expectations, N2O emissions were not reduced due to N immobilization after straw or GM incorporation. Reasons might be a higher O2 content in straw mulch top layer on upland soils which enhanced nitrification and inhibited the further reduction of N2O to N2, as well as excess N supply after not adjusting mineral fertilizer N rates to the N input from leguminous mungbean GM. Therefore, the annual GWP was 9-39% higher after straw incorporation during DS, as compared to straw removal. Additional incorporation of mungbean GM further increased the GWP, with the highest increment in R-R rotation (88%), followed by R-A (73%), and lowest in R-M rotation (55%), and annual GHG footprint of 11.8, 9.4, and 5.6 Mg CO2 eq. ha-1, respectively. My findings further demonstrate that the presence of earthworms in non-flooded rice soils can reduce adverse effects of straw

incorporation on CH4 release, without boosting N2O emissions or impairing yields. Straw organic carbon might be preserved in earthworm cast aggregates and thereby limit C availability for methanogenic CH4 production while methanotrophic CH4 consumption is increase due to improved soil aeration. My work also calls for a refinement of IPCC Tier 1 and 2 emission factor approach as it does not accurately represent emerging upland crop - paddy rice rotations. IPCC guidelines also do not consider a short pre-season flooding period (i.e. land-preparation). As observed in this long-term study, this period is contributing up to 13% to seasonal CH4 budget. Addressing this with a daily flux rate of 0.38 kg CH4-C day-1 for the days of land-preparation, analogous to the IPCC baseline emission factor, would take this period into account. My field GHG measurements of AWD water regime were used to validate and subsequently apply the biogeochemical model LandscapeDNDC at national scale, similar to IPCC Tier 3 approach for the UNFCC GHG reporting. Replacing CF field

management by the water-saving technique AWD, most likely can decrease GHG emissions from rice cultivation in the Philippines by one third. Compared to traditional double paddy system, rice - maize cropping has a significantly lower irrigation water demand and GHG footprint. Due to prolonged aerated soil conditions, upland - lowland rotation systems also allow for a more flexible residue management, a requirement for farmers as the ban of open-field burning is increasingly enforced. However, socio-economic concerns emerge when maize is cultivated to satisfy the growing demand for poultry feed and biofuel production and enters into direct competition to food security and the required land resources. Therefore, further research is needed to increase yields particularly of aerobic rice varieties and to further explore mitigation potentials e.g. of low-CH4 emitting rice cultivars. Further investigations should extend the process understanding of plant- and water-mediated CH4 release pathways with the help of stable isotope fractionation

Feeding Rice Straw to Cattle CRC Press

The

subsistence agriculture of the pre-chemical era efficiently sustained the nitrogen status of soils by maintaining a balance between N loss and N gain from biological nitrogen fixation (BNF): the microbial conversion of atmospheric N to a form usable by plants. This was possible with less intensive cropping, adaptation of rational crop rotations and intercropping schemes, and the use of legumes as green manure. Modern agriculture concentrates on maximum output, however, overlooking input efficiency; It is not sustainable. Intensive monocropping , with no or inadequate crop rotations or green manuring, together with the excessive use of chemical N fertilizers, results in an imbalance between N gain and N loss. The losses are often larger than the gains, and soil N status declines. The challenge is to sustain soil N fertility in many different tropical and temperate farming systems operating at high productivity levels. This requires judicious integration of BNF components, maintaining a good balance between N losses and gains. In this book, papers on BNF in crop forage and tree legumes are

augmented with discussions of integrated farming systems involving BNF, soil and N management, and recycling of legume residues. BNF by non-legumes are discussed, and attempts to transform cereals into nodulating plants are critically reviewed. Advances in the development of novel methodologies to understand symbiotic relations and to assess N 2 fixation in the field are described, and means are presented to enhance BNF through plant and soil management or breeding and selection. Problems encountered in exploiting BNF under field conditions are examined, as are promising approaches to improving BNF exploitation. **International Conference on Frontiers of Energy, Environmental Materials and Civil Engineering (FEEMCE 2013)** Food & Agriculture Org.

This book offers an overview of salt stress, which has a devastating effect on the yields of various agricultural crops around the globe. Excessive salts in soil reduce the availability of water, inhibit metabolic processes, and affect nutrient composition, osmotic balance, and hydraulic conductivity. Plants have developed a number of tolerance mechanisms,

such as various compatible solutes, polyamines, reactive oxygen species and antioxidant defense mechanisms, ion transport and compartmentalization of injurious ions. The exploitation of genetic variation, use of plant hormones, mineral nutrients, soil microbe interactions, and other mechanical practices are of prime importance in agriculture, and as such have been the subject of multidisciplinary research. Covering both theoretical and practical aspects, the book provides essential physiological, ecological, biochemical, environmental and molecular information as well as perspectives for future research. It is a valuable resource for students, teachers and researchers and anyone interested in agronomy, ecology, stress physiology, environmental science, crop science and molecular biology.

Methods for Measuring Greenhouse Gas Balances and Evaluating Mitigation Options in Smallholder Agriculture

Int. Rice Res. Inst.

The main objective of FEEMCE 2013 is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their

research results and development activities in Energy, Environmental Materials and Civil Engineering. This conference provides opportunities for the delegates to exchange new ideas and experiences face to face, to establish business or research relations and to find global partners for future collaboration. **Greenhouse Gas Footprint of Organic Amendments and Water Management in Rice Cropping Systems in Southeast Asia** Springer Nature Sustainable Rice Straw ManagementS pringer Nature International Conference on Environmental Awareness for Sustainable Development in conjunction with International Conference on Challenge and Opportunities Sustainable Environmental Development, ICEASD & ICCOSED 2019, 1-2 April 2019, Kendari, Indonesia Int. Rice Res. Inst. This book sheds new light on the remote sensing of agriculture in South/Southeast Asian (S/SEA) countries. S/SEA countries are growing rapidly in terms of population, industrialization, and urbanization. One of the critical challenges in the region is food security. In S/SEA, although total food production and productivity have

increased in previous decades, in recent years, the growth rate of food production has slowed down, mostly due to land use change, market forces and policy interventions. Further, the weather and climate systems in the region driven primarily by monsoon variability are resulting in droughts or flooding, impacting agricultural production. Therefore, monitoring crops, including agricultural land cover changes at regular intervals, is essential to predict and prepare for disruptions in the food supply in the S/SEA countries. The current book captures the latest research on the remote sensing of agricultural land cover/ land use changes, including mapping and monitoring crops, crop yields, biophysical parameter retrievals, multi-source data fusion for agricultural applications, and chapters on decision making and early warning systems for food security. The authors of this book are international experts in the field, and their contributions highlight the use of remote sensing and geospatial technologies for agricultural research and applications in South/Southeast Asia.