

Conservation Agriculture For Carbon Sequestration And Sustaining Soil Health

The State of the World’s Land and Water Resources for Food and Agriculture is FAO’s first flagship publication on the global status of land and water resources. It is an ‘advocacy’ report, to be published every three to five years, and targeted at senior level decision makers in agriculture as well as in other sectors. SOLAW is aimed at sensitizing its target audience on the status of land resources at global and regional levels and FAO’s viewpoint on appropriate recommendations for policy formulation. SOLAW focuses on these key dimensions of analysis: (i) quantity, quality of land and water resources, (ii) the rate of use and sustainable management of these resources in the context of relevant socio-economic driving factors and concerns, including food security and poverty, and climate change. This is the first time that a global, baseline status report on land and water resources has been made. It is based on several global spatial databases (e.g. land suitability for agriculture, land use and management, land and water degradation and depletion) for which FAO is the world-recognized data source. Topical and emerging issues on land and water are dealt with in an integrated rather than sectoral manner. The implications of the status and trends are used to advocate remedial interventions which are tailored to major farming systems within different geographic regions.

This report draws on work undertaken on various aspects of green growth in the agriculture and fisheries sectors. Conservation agriculture—consisting of four components including permanent soil cover, minimum soil disturbance, diversified crop rotations and integrated weed management—is considered the principal pathway to sustainable agriculture and the conservation of natural resources and the environment. Leading researchers in the field describe the basic principles of conservation agriculture, and synthesize recent advances and developments in conservation agriculture research. This book is a ready reference on conservation agriculture and reinforces the understanding for its utilization to develop environmentally sustainable and profitable food production systems. The book documents various elements of conservation agriculture; highlights the associated breeding and modeling efforts; analyzes the experiences and challenges in conservation agriculture in different regions of the world; and proposes some pragmatic options and new areas of research in this very important area of agriculture.

The book covers the spread of conservation agriculture (CA) to regions including Brazil, Argentina, Canada, Australia, Europe and emerging CA destinations in Asia and Africa. Topics covered include the various components of CA, and how their individual and combined implementation influence productivity, soil health and environmental quality under diverse edaphic and climatic conditions. The book will be useful to teachers, researchers, extensionists, farmers, and students interested in environmental quality.

Can Conservation Agriculture Mitigate Or Manage Climate Change?

Drawn

Carbon Sequestration, Carbon Markets, Technical Efficiency and Maize Production Using Conservation Agriculture in Mozambique

Carbon Capture, Utilization and Sequestration

Proceedings of the IFAD/FAO Expert Consultation, IFAD, Rome, Italy, 15 April 1999

The hidden potential

Sustainable Food and Agriculture: An Integrated Approach is the first book to look at the imminent threats to sustainable food security through a cross-sectoral lens. As the world faces food supply challenges posed by the declining growth rate of agricultural productivity, accelerated deterioration of quantity and quality of natural resources that underpin agricultural production, climate change, and hunger, poverty and malnutrition, a multi-faced understanding is key to identifying practical solutions. This book gives stakeholders a common vision, concept and methods that are based on proven and widely agreed strategies for continuous improvement in sustainability at different scales. While information on policies and technologies that would enhance productivity and sustainability of individual agricultural sectors is available to some extent, literature is practically devoid of information and experiences for countries and communities considering a comprehensive approach (cross-sectoral policies, strategies and technologies) to SFA. This book is the first effort to fill this gap, providing information on proven options for enhancing productivity, profitability, equity and environmental sustainability of individual sectors and, in addition, how to identify opportunities and actions for exploiting cross-sectoral synergies. Provides proven options of integrated technologies and policies, helping new programs identify appropriate existing programs Presents mechanisms/tools for balancing trade-offs and proposes indicators to facilitate decision-making and progress measurement Positions a comprehensive and informed review of issues in one place for effective education, comparison and evaluation

Land Degradation and Desertification: Assessment, Mitigation, and Remediation reports research results in sustainable land management and land degradation status and mitigation in 36 countries around the world. It includes background papers with continental and international perspectives dealing with land degradation and desertification studies. The book assembles various topics of interest for a large audience. They include carbon sequestration and stocks, modern techniques to trace the trends of land degradation, traditional and modern approaches of resource-base conservation, soil fertility management, reforestation, rangeland rehabilitation, land use planning, GIS techniques in desertification risk cartography, participatory ecosystem management, policy analyses and possible plans for action. Various climatic domains in Africa, Asia, Europe and The Americas are covered. The book will be of interest to a variety of environmental scientists, agronomists, national and international policy makers and a number of organizations dealing with sustainable management of natural resources.

During a workshop and field visit in December 2019 in South Africa we discussed the Role soil C of Conservation Agriculture and carbon sequestration for climate mitigation. The insights of the workshop comprised of: (i) Integrating livestock into crop systems to achieve circularity, (ii) Economic and environmental sustainability is possible without subsidy, (iii) The transition towards sustainable farming can also be slow: Every step into the direction of sustainability if a good one, (iv) Vision and love for the land: a good farmer is a steward of the land; and (v) Ways to find hands-on local, but holistic solutions for every farm.

Conservation agriculture practices are a promising sustainable farming system being promoted by various organizations in Mozambique. This thesis analyzes the impact of adoption of conservation agriculture practices on maize production technical efficiency, carbon sequestration and farmer income. The technical efficiency estimation utilizes data from a household survey conducted in Manica and Tete provinces of Mozambique. Soil carbon simulations use information from various sources including the household survey, European Energy markets and local meteorological data from the National Oceanic and Atmospheric Administration. The second chapter of the thesis evaluates the technical efficiency of maize production using conservation agriculture practices. This section applies data envelopment analysis to estimate maize production technical efficiency scores of fields managed with conservation and conventional farming practices. The results suggest that the technical efficiency scores of fields managed with conservation agriculture practices is higher than fields managed with conventional practices. In the third chapter, carbon sequestration in fields managed using various farming practices, including conservation agriculture, are simulated. The simulation results suggest that adopting conservation agriculture practices results in higher soil carbon accumulation. Scenarios with longer conservation practices use as well as using higher fertilizer rates resulted in higher soil organic carbon. This chapter also evaluates the income benefits of a hypothetical payments for environmental services program for conservation agriculture practices adopters, concluding that there is a potential for increasing farmers income through payments carbon sequestration in fields managed with conservation agriculture practices.

Potential Role of Conservation Agriculture in South Africa for Carbon Sequestration for Climate Mitigation

Sustainable Intensification to Advance Food Security and Enhance Climate Resilience in Africa

Increasing Productivity in African Food and Agricultural Systems

Management of Carbon Sequestration in Soil

Climate Change and Sustainability in Agriculture

This book is a much-expanded and updated edition of a previous volume, published in 1996 as “No-tillage Seeding: Science and Practice”. The base objective remains to describe, in lay terms, a range of international experiments designed to examine the causes of successes and failures in no-tillage. The book summarizes the advantages and disadvantages of no tillage and options, without promoting any particular product.

With the use of high-level soil management technology, Africa could feed several billion people, yet food production has generally stagnated since the 1960s. No matter how powerful the seed technology, the seedling emerging from it can flourish only in a healthy soil. Accordingly, crop yields in Africa, South Asia, and the Caribbean could be doubled or tripled through management. Principles of Sustainable Soil Management in Agroecosystems describes the application of these laws to enhance ecosystem services while restoring degraded soils and promoting sustainable use. With chapters contributed by world-class soil scientists, ecologists, and social scientists, this book outlines critical changes in management of agricultural soils to meet the demands of the present and projected future population. These changes include conversion to no-till and conservation agriculture; adoption of strategies of integrated nutrient management, water harvesting, and use of drip sub-irrigation; complex cropping/farming systems such as cover cropping and agroforestry; and use of nano-enhanced fertilizers. The book is better than a soil than what is put into it without degrading its quality. The strategy is to replace what is removed, respond wisely to what is changed, and be pro-active to what may happen because of natural and anthropogenic perturbations. The chapters, which exemplify these ideas, cover a range of topics including organic farming, soil fertility, crop-symbiotic soil microorganisms, soil restoration, carbon sink capacity of soils, soil renewal and sustainability, and the marginality principle.

Building on FAO policy advice and incorporating lessons from ongoing agricultural carbon finance projects of FAO and other organizations, this document will provide an overview of potential mitigation finance opportunities for soil carbon sequestration. The first part provides an overview of the opportunities for climate change mitigation from agricultural soil carbon projects developers and decision makers at national level concerned with environmental and agriculture policies and incentives and farmers’ associations working towards rural development and poverty alleviation.

The objective of IFAD/FAO consultation was to bring together experts in order to review the state-of-the-art knowledge in carbon sequestration for the land management programmes IFAD and FAO in Latin America and the Caribbean. The main objectives addressed were: how to stabilize the atmospheric concentration of CO2; how to increase agricultural productivity and income; and how to activate the flow of new funds for the benefit of Convention implementation through carbon sequestration, i.e. its binding and neutralisation. It is believed that carbon stock in soils is either stable or increasing and that it was a major source of global carbon emission, a major cause of global climate change

Physiological, Agricultural and Ecological Aspects

Proceedings of the 8th Nitrogen Workshop held at the University of Ghent, 5–8 September, 1994

Assessment of Soil Carbon Sequestration and Climate Change Mitigation Potential Under Conservation Agriculture (CA) Practices in the Eastern Gangetic Plains

Managing Systems at Risk

OECD Green Growth Studies Food and Agriculture

Soil Degradation and Restoration in Africa

• **New York Times bestseller** • **The 100 most substantive solutions to reverse global warming, based on meticulous research by leading scientists and policymakers around the world**
“ At this point in time, the Drawdown book is exactly what is needed; a credible, conservative solution-by-solution narrative that we can do it. Reading it is an effective inoculation against the widespread perception of doom that humanity cannot and will not solve the climate crisis. Reported-by-effects include increased determination and a sense of grounded hope. ”
—Per Espen Stoknes, Author, What We Think About When We Try Not To Think About Global Warming
“ There ’ s been no real way for ordinary people to get an understanding of what they can do and what impact it can have. There remains no single, comprehensive, reliable compendium of carbon-reduction solutions across sectors. At least until now. . . . The public is hungry for this kind of practical wisdom. ”
—David Roberts, Vox
“ This is the ideal environmental sciences textbook—only it is too interesting and inspiring to be called a textbook. ”
—Peter Karsiva, Director of the Institute of the Environment and Sustainability, UCLA
In the face of widespread fear and apathy, an international coalition of researchers, professionals, and scientists have come together to offer a set of realistic and bold solutions to climate change. One hundred techniques and practices are described here—some are well known; some you may have never heard of. They range from clean energy to educating girls in lower-income countries to land use practices that pull carbon out of the air. The solutions exist, are economically viable, and communities throughout the world are currently enacting them with skill and determination. If deployed collectively on a global scale over the next thirty years, they represent a credible path forward, not just to slow the earth ’ s warming but to reach drawdown, that point in time when greenhouse gases in the atmosphere peak and begin to decline. These measurs promise cascading benefits to human health, security, prosperity, and well-being—giving us every reason to see this planetary crisis as an opportunity to create a just and livable world.

This book addresses the importance of soil processes in the global carbon cycle.Agricultural activities considered responsible for an increase in CO2 levels in our atmosphere include: deforestation, biomass burning, tillage and intensive cultivation, and drainage of wetlands.However, agriculture can also be a solution to the problem in which carbon can be removed from the atmosphere and permanently sequestered into the soil. Management of Carbon Sequestration in Soil highlights the importance of world soils as a sink for atmospheric carbon and discusses the impact of tillage, conservation reserve programs (CRP), management of grasslands and woodlands, and other soil and crop management and land use practices that lead to carbon sequestration.

This 35-chapter book is based on several oral and poster presentations including both invited and contributory chapters. The book is thematically based on four pillars of sustainability, with focus on sub-Saharan Africa (SSA): Environment, Economic, Social and Institutional. The environmental sustainability, which determines economic and social/institutional sustainability, refers to the rate of use of natural resources (soil, water, landscape, vegetation) which can be continued indefinitely without degrading their quality, productivity and ecosystem services for different ecoregions of SSA. This book will help achieve the Sustainable Development Goals of the U.N. in SSA. Therefore, the book is of interest to agriculturalists, economists, social scientists, policy makers, extension agents, and development/bilateral organizations. Basic principles explained in the book can be pertinent to all development organizations.

“Conservation Agriculture (the use of no tillage systems) to preserve soil structure and integrity has become an increasingly important step towards sustainable farming. This book brings together conservation agriculture and climate smart decision making processes for the first time, focusing on Africa”--

Soil Organic Carbon

Conservation Agriculture in Africa

Recent Advances in Carbon Capture and Storage

The State of the World’s Land and Water Resources for Food and Agriculture

Climate Change Mitigation Finance for Smallholder Agriculture

Environmental and Agronomic Impacts

This volume includes the papers presented during the 1st Euro-Mediterranean Conference for Environmental Integration (EMCEI) which was held in Soussse, Tunisia in November 2017. This conference was jointly organized by the editorial office of the Euro-Mediterranean Journal for Environmental Integration in Sfax, Tunisia and Springer (MENA Publishing Program) in Germany. It aimed to give a more concrete expression to the Euro-Mediterranean integration process by supplementing existing North-South programs and agreements with a new multilateral scientific forum that emphasizes in particular the vulnerability and proactive remediation of the Euro-Mediterranean region from an environmental point of view. This volume gives a general and brief overview on current research focusing on emerging environmental issues and challenges and its applications to a variety of problems in the Euro-Mediterranean zone and surrounding regions. It contains over five hundred and eighty carefully refereed short contributions to the conference. Topics covered include (1) innovative approaches and methods for environmental sustainability, (2) environmental risk assessment, bioremediation, ecotoxicology, and environmental safety, (3) water resources assessment, planning, protection, and management, (4) environmental engineering and management, (5) natural resources: characterization, assessment, management, and valorization, (6) intelligent techniques in renewable energy (biomass, wind, waste, solar), (7) sustainable management of marine environment and coastal areas, (8) remote sensing and GIS for geo-environmental investigations, (9) environmental impacts of geo/natural hazards (earthquakes, landslides, volcanic, and marine hazards), and (10) the environmental health science (natural and social impacts on human health). Presenting a wide range of topics and new results, this edited volume will appeal to anyone working in the subject area, including researchers and students interested to learn more about new advances in environmental research initiatives in view of the ever growing environmental degradation in the Euro-Mediterranean region, which has turned environmental and resource protection into an increasingly important issue hampering sustainable development and social welfare.

Feeding an ever-growing world population without exhausting natural resources is among one of the major challenges facing modern agriculture. This challenge is further compounded by climate change related threats. Numerous alternatives to conventional farming are proposed and implemented around the world with mixed results. Conservation Agriculture being one of them. Although Conservation Agriculture - a set of sustainable and environmentally friendly crop production techniques - yields interesting results in some parts of the world, its power as a climate change mitigating or managing agent is sometimes unclear and unrecognized. Due to the fallout of climate change on farm production and food security, Conservation Agriculture is one solution if its attenuating effects are evident, adopted and implemented. After a brief definition of Conservation Agriculture principles and goals, its pros and cons are considered as well as its adoption and non-adoption in some parts of the world. Finally, the contribution of Conservation Agriculture to mitigate climate change through carbon sequestration is further highlighted.

Feeding the increasing global population, which is projected to reach ~10 billion by 2050, there has been increasing demands for more improved/sustainable agricultural management practices that can be followed by farmers to improve productivity without jeopardizing the environment and ecosystem. Indeed, about 95% of our food directly or indirectly comes from soil. It is a precious resource, and sustainable soil management is a critical socio-economic and environmental issue. Maintaining the environmental sustainability while the world is facing resource degradation, increasing climate change and population explosion is the current challenge of every food production sectors. Thus, there is an urgent need to evolve a holistic approach such as conservation agriculture to sustain higher crop productivity in the country without deteriorating soil health. Conservation Agriculture (CA), is a sustainable approach to manage agro-ecosystems in order to improve productivity, increase farm profitability and food security and also enhance the resource base and environment. Worldwide, it has been reported various benefits and prospects in adopting CA technologies in different agro-climatic conditions. Yet, CA in arid and semi-arid regions of India and parts of south Asia raises uncertainties due to its extreme climates, large scale residue burning, soil erosion and other constraints such as low water holding capacity, high potential evapotranspiration, etc. . Thus, the proposed book has 30 chapters addressing all issues relevant to conservation agriculture/no-till farming system. The book also gives further strengthening existing knowledge in relation to soil physical, chemical and biological processes and health within close proximity of CA as well as machinery requirements. Moreover, the information on carbon (C) sequestration, C credits, greenhouse gas (GHG) emission, mitigation of climate change effects and socio-economic view on CA under diverse ecologies namely rainfed, irrigated and hill eco-region is also deliberated. For large scale adoption of CA practices in South Asian region especially in India and other countries need dissemination of best-bet CA technologies for dominant soil types/cropping systems through participatory mode, strong linkages and institutional mechanism and public-private-policy support. We hope this book gives a comprehensive and clear picture about conservation agriculture/no-till farming and its associated problem, challenges, prospects and benefits. This book shall be highly useful reference material to researchers, scientists, students, farmers and land managers for efficient and sustainable management of natural resources.

Nitrogen is the most important nutrient in agricultural practice because the availability of nitrogen from the soil is generally not enough to support crop yields. To maintain soil fertility, the application of organic matters and crop rotation have been practiced. Farmers can use convenient chemical nitrogen fertilizers to obtain high crop yields. However, the inappropriate use of nitrogen fertilizers causes environmental problems such as nitrate leaching, contamination in groundwater, and the emission of N2O gas. This book is divided into the following four sections: “Ecology and Environmental Aspects of Nitrogen in Agriculture”, “Nitrogen Fertilizers and Nitrogen Management in Agriculture”, “N Utilization and Metabolism in Crops”, “Plant-Microbe Interactions”.

Carbon Management in Tropical and Sub-Tropical Terrestrial Systems

Nitrogen in Agriculture

The Role of the U. S. Agriculture Sector and Congressional Action

Sustainable Food and Agriculture

A Guide Book to Harvesting Soil Carbon Sequestration Benefits

An Integrated Approach

Soil organic matter (SOM) is the primary determinant of soil functionality. Soil organic carbon (SOC) accounts for 50% of the SOM content, accompanied by nitrogen, phosphorus, and a range of macro and micro elements. As a dynamic component, SOM is a source of numerous ecosystem services critical to human well-being and nature conservancy. Important among these goods and services generated by SOM include moderation of climate as a source or sink of atmospheric CO2 and other greenhouse gases, storage and purification of water, a source of energy and habitat for biota (macro, meso, and micro-organisms), a medium for plant growth, cycling of elements (N, P, S, etc.), and generation of net primary productivity (NPP). The quality and quantity of NPP has direct impacts on the food and nutritional security of the growing and increasingly affluent human population. Soils of agroecosystems are depleted of their SOC reserves in comparison with those of natural ecosystems. The magnitude of depletion depends on land use and the type and severity of degradation. Soils prone to accelerated erosion can be strongly depleted of their SOC reserves, especially those in the surface layer. Therefore, conservation through restorative land use and adoption of recommended management practices to create a positive soil-ecosystem carbon budget can increase carbon stock and soil health. This volume of Advances in Soil Sciences aims to accomplish the following: Present impacts of land use and soil management on SOC dynamics Discuss effects of SOC levels on agronomic productivity and use efficiency of inputs Detail potential of soil management on the rate and cumulative amount of carbon sequestration in relation to land use and soil/crop management Deliberate the cause-effect relationship between SOC content and provisioning of some ecosystem services Relate soil organic carbon stock to soil properties and processes Establish the relationship between soil organic carbon stock with land and climate Identify controls of making soil organic carbon stock as a source or sink of CO2 Connect soil organic carbon and carbon sequestration for climate mitigation and adaptation

Continued population growth, rapidly changing consumption patterns and the impacts of climate change and environmental degradation are driving limited resources of food, energy, water and materials towards critical thresholds worldwide. These pressures are likely to be substantial across Africa, where countries will have to find innovative ways to boost crop and livestock production to avoid becoming more reliant on imports and food aid. Sustainable agricultural intensification - producing more output from the same area of land while reducing the negative environmental impacts - represents a solution for millions of African farmers. This volume presents the lessons learned from 40 sustainable agricultural intensification programmes in 20 countries across Africa, commissioned as part of the UK Government Foresight project. Through detailed case studies, the authors of each chapter examine how to develop productive and sustainable agricultural systems and how to scale up these systems to reach many more millions of people in the future. Themes covered include crop improvements, agroforestry and soil conservation, conservation agriculture, integrated pest management, horticulture, livestock and fodder crops, aquaculture, and novel policies and partnerships.

Soil degradation is a widespread problem in Africa resulting in low agricultural productivity while demand for food continues to increase. Degradation is caused by accelerated erosion, acidification, contamination, depletion of soil organic matter and plant nutrients, and salinization. Food and nutritional security of the growing population of Africa can only be achieved if degraded soils are restored, and soils of agroecosystems are managed prudently and sustainably. This book describes the soils of Africa, processes of soil degradation, extent and severity of soil degradation, and the impacts of degradation processes on food and nutritional security.

Soil organic carbon (SOC), a key component of the global carbon (C) pool, plays an important role in C cycling, regulating climate, water supplies and biodiversity, and therefore in providing the ecosystem services that are essential to human well-being. Most agricultural soils in temperate regions have now lost as much as 60% of their SOC, and as much as 75% in tropical regions, due to conversion from natural ecosystems to agricultural uses and mainly due to continuous soil degradation. Sequestering C can help to offset C emissions from fossil fuel combustion and other C-emitting activities, while also enhancing soil quality and long-term agronomic productivity. However, developing effective policies for creating terrestrial C sinks is a serious challenge in tropical and subtropical soils, due to the high average annual temperatures in these regions. It can be accomplished by implementing improved land management practices that add substantial amounts of biomass to soil, cause minimal soil disturbance, conserve soil and water, improve soil structure, and enhance soil fauna activity. Continuous no-till crop production is arguably the best example. These soils need technically sound and economically feasible strategies to sustainably enhance their SOC pools. Hence, this book provides comprehensive information on SOC and its management in different land-use systems, with a focus on preserving soils and their ecosystem services. The only book of its kind, it offers a valuable asset for students, researchers, policymakers and other stakeholders involved in the sustainable development and management of natural resources at the global level.

Soil Management of Smallholder Agriculture

Proceedings of Euro-Mediterranean Conference for Environmental Integration (EMCEI-1), Tunisia 2017

Basic Soil Processes

Climate Change

The Most Comprehensive Plan Ever Proposed to Reverse Global Warming

Climate Smart Agricultural Development

The agriculture (ag) sector is a source of greenhouse gas (GHG) emissions, which many scientists agree are contributing to observed climate change. Ag. is also a sink, for sequestering carbon, which might offset GHG emissions by capturing and storing carbon in ag. soils. The two key types of GHG emissions associated with agricultural activities are methane and nitrous oxide. Contents of this report: (1) Ag. Sinks and Emissions: Source of Nat. Est.; Ag. Emissions; Ag. Carbon Sinks; Potential for Additional Uptake; (2) Mitigation Strategies in the Ag. Sector: Federal Programs; State Programs; (3) Congressional Action: Climate Change Proposals; 2009 Farm Bill Provisions; Related Initiatives Involving U.S. Ag.; Considerations for Congress; Illus.

The publication was launched at the Global Symposium on Soil Organic Carbon (GSOC) held at FAO headquarters (Rome, 21–23 March 2017) . It provides an overview to decision-makers and practitioners of the main scientific facts and information regarding the current knowledge and knowledge gaps on Soil Organic Carbon. It highlights how better information and good practices may be implemented to support ending hunger, adapting to and mitigating climate change and achieving overall sustainable development.

This report assesses the potential of U.S. cropland to sequester carbon, concluding that properly applied soil restorative processes and best management practices can help mitigate the greenhouse effect by decreasing the emissions of greenhouse gases from U.S. agricultural activities and by making U.S. cropland a major sink for carbon sequestration. Topics include: Describe the greenhouse processes and global trends in emissions as well as the three principal components of anthropogenic global warming potential Present data on U.S. emissions and agriculture’s related role Examines the soil organic carbon (SOC) pool in soils of the U.S. and its loss due to cultivation Provides a reference for the magnitude of carbon sequestration potential Analyzes the primary processes governing greenhouse gas emission from the pedosphere Establishes a link between SOC content and soil quality Outlines strategies for mitigating emissions from U.S. cropland and the U.S. Government Foresight project. Through detailed case studies, the authors of each chapter examine how to develop productive and sustainable agricultural systems and how to scale up these systems to reach many more millions of people in the future. Themes covered include crop improvements, agroforestry and soil conservation, conservation agriculture, integrated pest management, horticulture, livestock and fodder crops, aquaculture, and novel policies and partnerships.

Nearly two billion people depend on hundreds of millions of smallholder farmers for food security. Yet, these farmers’ lives also hang in the balance due to their extreme vulnerability to the risks of soil degradation and depletion, soil exhaustion, climate change, and numerous biotic and abiotic stresses. Soil

Management of Smallholder Agriculture explores the potential smallholder agriculture hold for advancing global food security and outlines the challenges to achieving this goal. The book addresses the challenges and opportunities that resource-poor and small landholders face and provides recommended management practices to alleviate soil-related constraints, and increase and sustain crop yield and production. It discusses the cultural, economic, social, and technological aspects of sustainable soil management for smallholder farmers. It then examines soil-related and institutional constraints, principles of sustainable agriculture, soil quality improvement, nutrient and soil fertility management, soil carbon sequestration, soil security, efficient use of resources, and agronomic production. Edited by experts, the book makes the case for the adoption of proven technologies of sustainable intensification, producing more from less, both for advancing agronomic productivity and adapting to changing climate. It outlines a strategy that will usher in a soil-based Green Revolution by increasing the use efficiency of energy-based inputs such as fertilizers, pesticides, and irrigation to restore soil quality, and sequestering carbon in the terrestrial ecosystems. This strategy helps small farms narrow the gap between the actual and attainable crop yield.

Recent Advances in Environmental Science From the Euro-Mediterranean and Surrounding Regions

Studies on Green House Gas Emissions and Carbonsequestration Under Conservation Agriculture in Maize Based Cropping Systems [With CD Copy]

The Potential of U.S. Cropland to Sequester Carbon and Mitigate the Greenhouse Effect

No-tillage Seeding in Conservation Agriculture

A Sustainable Approach for Soil Health and Food Security

Land Degradation and Desertification: Assessment, Mitigation and Remediation

This book contains the proceedings of the ‘8th Nitrogen Workshop’ which was held at the University of Ghent, Belgium, from 5 to 8 September 1994. Although nitrogen dynamics in different ecosystems have been studied for several decades, new orientations and other emphases have recently emerged. Previously, nitrogen was considered as an essential element mostly in terms of productivity, but now, more emphasis is attached to environmental consequences. More than 100 contributions in this book tackle recent developments within the fields of nitrogen advice systems, plant response to fertilization, immobilization and mobilization, nitrification, denitrification, leaching, ammonia volatilization and biological nitrogen fixation. A large number of papers is devoted to the formation of gaseous nitrogen compounds, while mineralization-immobilization is another topic of important interest. The book also contains the reports of discussion groups on different aspects of the nitrogen cycle.

Conservation Agriculture for Carbon Sequestration and Sus Ining Soil HealthConservation Agriculture For Carbon Sequestration And Sustaining Soil HealthNew India Publishing Agency

This book is divided in two sections. Several chapters in the first section provide a state-of-the-art review of various carbon sinks for CO2 sequestration such as soil and oceans. Other chapters discuss the carbon sequestration achieved by storage in kerogen nanopores, CO2 miscible flooding and generation of energy efficient solvents for postcombustion CO2 capture. The chapters in the second section focus on monitoring and tracking of CO2 migration in various types of storage sites, as well as important physical parameters relevant to sequestration. Both researchers and students should find the material useful in their work.

This 32-chapter volume represents the core of several oral and poster presentations made at the conference. In addition to Introduction and Conclusion sections, the book is thematically divided into 7 sections, namely, 1) Land Use and Farming Systems, 2) Effects of Climate Change on Crop Yield, 3) Soil Nutrient and Water Management for Carbon Sequestration, 4) Rehabilitation of Degraded Lands through Forestry and Agroforestry, 5) Management of Animal Production for Greenhouse Gas Emissions, 6) Smallholder Adaptation to Climate Change, and 7) Economic, Social and Policy Issues. It addresses these themes in the context of sustainable intensification (SI). It implies increasing agronomic production from the existing land while improving/restoring its quality and decreasing the C or environmental footprint. Simply put, SI means producing more from less.

Bio-economics of Conservation Agriculture and Soil Carbon Sequestration in Developing Countries

Conservation Agriculture For Carbon Sequestration And Sustaining Soil Health

Sustainable Intensification

Climate Change and Multi-Dimensional Sustainability in African Agriculture

Progress in Nitrogen Cycling Studies

A Provisional Research Agenda

Soil organic matter (SOM) is a highly-reactive constituent of the soil matrix because of its large surface area, high ion exchange capacity, enormous affinity for water due to hygroscopicity, and capacity to form organo-mineral complexes. It is an important source and sink of atmospheric CO2 and other greenhouse gases depending on climate, land use, soil and crop management, and a wide range of abiotic and biotic factors, including the human dimensions of socioeconomic and political factors. Agroecosystems are among important controls of the global carbon cycle with a strong impact on anthropogenic or abrupt climate change. This volume of Advances in Soil Sciences explains pedological processes so-in-motion by increases in SOM content of depleted and degraded soils. It discusses the relationship between SOM content and critical soil quality parameters including aggregation, water retention and transport, aeration and gaseous exchange, and chemical composition of soil air. The book identifies policy options needed to translate science into action for making sustainable management of SOM as a strategy for adaptation to and mitigation of climate change. Features: Relates soil organic matter stock to soil processes, climate parameters, vegetation, landscape attributes Establishes relationships between soil organic matter and land use, species, and climate Identifies land use systems for protecting and restoring soil organic matter stock Links soil organic matter stock with the global carbon cycle for mitigation of climate change Part of the Advances in Soil Sciences series, this volume will appeal to agricultural, environmental, and soil scientists demonstrating the link between soil organic matter stock and provisioning of critical ecosystem services for nature and humans.

Carbon capture and storage (CCS) has been considered as a practical way in sequestering the huge anthropogenic CO2 amount with a reasonable cost until a more pragmatic solution appears. The CCS can work as a bridge before fulfilling the no-CO2 era of the future by applying to large-scale CO2 emitting facilities. But CCS appears to lose some passion by the lack of services in technical developments and in commercial success stories other than EOR. This is the time to go back to basics, starting from finding a solution in small steps. The CCS technology desperately needs far new ideas and breakthroughs that can overcome earlier attempts through improving, modifying, and switching the known principles. This book tries to give some insight into developing an urgently needed technical breakthrough through the recent advances in CCS research, in addition to the available small steps like soil carbon sequestration. This book compiles 41 dealing various issues, prospects and importance of conservation agriculture practices followed across different regions with special emphasis on rainfed regions. We hope this book on conservation agriculture will be highly useful to researchers, scientists, students, farmers and land managers for efficient and sustainable management of natural resources.

Conservation Agriculture for Carbon Sequestration and Sus Ining Soil Health

Soil Organic Matter and Feeding the Future

Carbon Sequestration, Co-benefits, and Conservation Programs

Principles of Sustainable Soil Management in Agroecosystems

Conservation Agriculture

Prevention of Land Degradation, Enhancement of Carbon Sequestration and Conservation of Biodiversity Through Land Use Change and Sustainable Land Management with a Focus on Latin America and the Caribbean