Essential Titles: Soil Health

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Advances in measuring soil health

Editor: Professor Wilfred Otten, Cranfield University, UK

This volume begins with a review of advances in measuring soil biological activity. Parts 2 and 3 survey developments in measuring soil physical and chemical properties. It concludes by reviewing soil health indicators and decision support systems for improving soil management.

CHAPTER TITLES

Part 1 Measuring soil biological activity; 1.Assessing soil health by measuring fauna; 2.Quantifying earthworm community structures as indicators of soil health; 3.Characterisation of fungal communities and functions in agricultural soils; **Part 2 Measuring soil physical and chemical properties;** 4.Advances in visual soil evaluation techniques; 5.Imaging soil structure to measure soil functions and soil health with X-ray computed micro-tomography; 6.Geophysical methods to assess soil characteristics; 7.Advances in techniques to assess soil erodibility; 8.Advances in measuring mechanical properties of soil in relation to soil health; 9.Advances in near-infrared (NIR) spectroscopy to assess soil health; 10.Spectral mapping of soil organic carbon; **Part 3 From measurement to management;** 11.Developing soil health indicators for improved soil management on farm; 12.Developing decision support systems (DSS) for farm soil and crop management

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Improving soil health

Editor: Professor William Horwath, University of California-Davis, USA

This collection summarises current research on the effects of different management strategies on the physical, chemical and biological properties of soils. It assesses the viability of these management strategies, including zero tillage and intercropping, as a means for improving crop yield, ecosystem productivity and soil health in general.

CHAPTER TITLES

Part 1 Dimensions of soil health; 1.Soil health: definitions and key concepts; 2.Understanding biological processes in soil; 3.Understanding mycorrhizal activity as a component of soil health; **Part 2 Soil management;** 4.Assessing the effects of zero/no till cultivation practices on soil health; 5.Agricultural traffic management systems and soil health; 6.Assessing the effects of cover crops on soil health; 7.Assessing the effects of crop residue retention on soil health; **Part 3 Soil amendments;** 8.Assessing the effects of compost on soil health; 9.Assessing the effects of using animal manure on soil health; 10.Assessing the effect of biosolids on soil health; 11.Biofertilizers: assessing the effects of arbuscular mycorrhizal fungi (AMF) on soil health; 12.Biofertilizers: assessing the effects of plant growth-promoting rhizobacteria (PGCR) on soil health; 13.The role of liming in improving soil health

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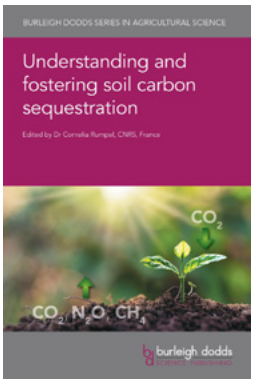

Understanding and fostering soil carbon sequestration

Editor: Dr Cornelia Rumpel, CNRS, France

This collection reviews the wealth of recent research on important aspects of soil carbon sequestration in different environments and soil types and its contribution to ensuring a positive carbon budget at the farm and landscape level.

CHAPTER TITLES

1.Introduction; **Part 1 Understanding carbon sequestration in soils;** 2.Mechanisms of soil organic carbon sequestration; 3.Factors affecting soil organic carbon dynamics; 4.The role of biodiversity and soil biological activity on organic carbon sequestration; 5.Effects of abiotic factors affecting processes of soil organic carbon sequestration at different scales; 6.Co-benefits and trade-offs in soil organic carbon sequestration; 7.The role of inorganic soil carbon in soil carbon sequestration; 8.Soil organic carbon sequestration and climate change; 9.Transformation of organic wastes into soil amendments to foster soil organic carbon sequestration; **Part 2 Measuring carbon sequestration in soils;** 10.Introduction: key issues in measuring carbon sequestration in soils; 11.Advances in measuring soil organic carbon stocks and dynamics at the profile scale; 12.Advances in soil mapping to assess levels of carbon sequestration at landscape scales; 13.Advances in modelling soil organic carbon dynamics; 14.Digital tools for assessing soil organic carbon at farm and regional scale; **Part 3 Fostering carbon sequestration in soils;** 15.Promoting carbon sequestration in soils: the importance of soil, region and context-specific interventions; 16.Agriculture practices to improve soil carbon sequestration in upland soil; 17.Agriculture practices to improve soil carbon sequestration in submerged soil; 18.Managing grasslands to optimise soil carbon sequestration; 19.Managing forest soils to optimise carbon sequestration;

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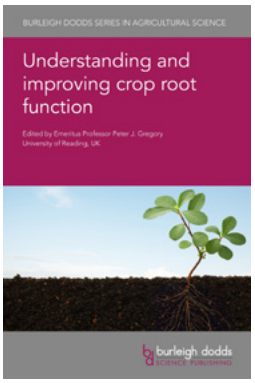

Understanding and improving crop root function

Editor: Emeritus Professor Peter J. Gregory, University of Reading, UK

This volume features authoritative reviews of current research in all aspects of root science, including root growth regulators, root anatomy, nutrient acquisition and root system architecture.

CHAPTER TITLES

Part 1 Analysing root system architecture, growth and interactions with the rhizosphere; 1.Advances in root architectural modeling; 2.The development of crop root architecture and optimization of nutrition acquisition: the case of rice; 3.Advances in understanding plant root growth regulators; 4.Advances in understanding plant root anatomy and nutrient acquisition; 5.Advances in understanding plant root hairs in relation to nutrient acquisition and crop root function; 6.Understanding plant-root interactions with rhizobacteria to improve biological nitrogen fixation in crops; 7.Advances in understanding arbuscular mycorrhizal fungal effects on soil nutrient cycling; **Part 2 Root response to biotic threats;** 8.Advances in understanding plant root response to weedy root parasites; 9.Advances in understanding plant root responses to root-feeding insects; 10.Advances in understanding plant root response to nematode attack; **Part 3 Root uptake of nutrients and water;** 11.Advances in the understanding of nitrogen (N) uptake by plant roots; 12.Advances in understanding plant root uptake of phosphorus; 13.Advances in understanding plant root water uptake; **Part 4 Improving root function;** 14.Understanding and exploiting the genetics of plant root traits; 15.The use of plant growth-promoting rhizobacteria (PGPR) to improve root function and crop nutrient use efficiency;

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Managing soil health for sustainable agriculture

Volume 1: Fundamentals

Editor: Dr Don Reicosky, Soil Scientist Emeritus, USDA-ARS and University of Minnesota, USA

There is a growing concern that intensive agriculture in the developed world is damaging soil health. This volume reviews advances in our understanding of soil structure and dynamics which form the foundation for effective soil management.

CHAPTER TITLES

Part 1 Overview; 1.Soil and soil health: an overview; 2.Soil ecosystem services: an overview; 3.Soil health and climate change: a critical nexus; 4.Integrated soil health management: a framework for soil conservation and regeneration; 5.The economics of soil health; **Part 2 Soil structure and composition;** 6.Soil texture and structure: role in soil health; 7.Chemical composition of soils: role in soil health; 8.Soil microorganisms: role in soil health; 9.The role of soil fauna in soil health and delivery of ecosystem services; **Part 3 Soil dynamics;** 10.The role of soil hydrology in soil health; 11.Nutrient cycling in soils; 12.Plant–soil interactions: an overview; 13.Mechanisms of soil erosion/degradation

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Managing soil health for sustainable agriculture

Volume 2: Monitoring and management

Editor: Dr Don Reicosky, Soil Scientist Emeritus, USDA-ARS and University of Minnesota, USA

This second volume reviews ways of classifying and measuring soils and their properties. It then discusses ways soil health can be maintained or enhanced to ensure sustainable agricultural production, as well as regional case studies of managing soil health in practice.

CHAPTER TITLES

Part 1 Soil monitoring; 1.Soil health assessment and inventory: Indices and databases; 2.Soil sampling for soil health assessment; 3.Biological indicators of soil health in organic cultivation; 4.The impact of heavy metal contamination on soil health; 5.Modelling soil organic matter dynamics as a soil health indicator; **Part 2 Managing soil health;** 6.Drainage requirements to maintain soil health; 7.Managing irrigation for soil health in arid and semi-arid regions; 8.Effects of crop rotations and intercropping on soil health; 9.Use of cover crops to promote soil health; 10.Optimising fertiliser use to maintain soil health; 11.Manure and compost management to maintain soil health; 13.Conservation grass hedges and soil health parameters; 14.Managing soil health in organic cultivation; **Part 3 Regional strategies in the developing world;** 15.Supporting smallholders in maintaining soil health: key challenges and strategies; 16.Maintaining soil health in Africa; 17.Organic amendments to improve soil health and crop productivity: a case study in China; 18.Soil health assessment and maintenance in Central and South-Central Brazil; 19.Maintaining soil health in dryland areas

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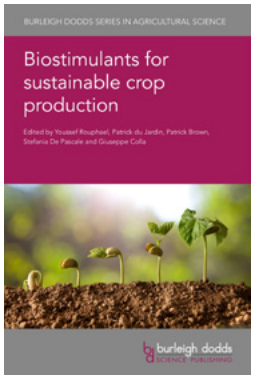

Biostimulants for sustainable crop production

Editors: Youssef Rouphael, University of Naples Federico II, Italy; Patrick du Jardin, University of Liège, Belgium; Patrick Brown, University of California-Davis, USA; Stefania de Pascale, University of Naples Federico II, Italy; and Giuseppe Colla, University of Tuscia, Italy

Part 1 reviews research on ways of evaluating biostimulants. Part 2 surveys the various types of biostimulant, from arbuscular mycorrhizal fungi (AMF) to seaweed extracts. Part 3 discusses advances in their practical application in areas such as enhancing nutrient use efficiency (NUE).

CHAPTER TITLES

Part 1 Introduction and biostimulant characterization; 1.Plant biostimulants: a new paradigm for the sustainable intensification of crops; 2.Bioactive compounds and evaluation of biostimulant activity; **Part 2 Non-microbial and microbial categories of biostimulants;** 3.Humic substances (HS) as plant biostimulants in agriculture; 4.Seaweed extracts as plant biostimulants in agriculture; 5.Biostimulant action of protein hydrolysates on crops; 6.Silicon as a biostimulant in agriculture; 7.Plant growth-promoting rhizobacteria (PGPR) as plant biostimulants in agriculture; 8.Arbuscular mycorrhizal fungi as biostimulants for sustainable crop production; **Part 3 Innovation and practical applications;** 9.Designing and formulating microbial and non-microbial; 10.Plant biostimulants and their influence on nutrient use efficiency (NUE); 11.Combining plant biostimulants and precision agriculture

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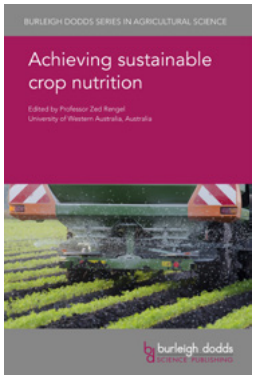

Achieving sustainable crop nutrition

Editor: Professor Zed Rengel, University of Western Australia, Australia

This collection reviews current research on understanding nutrient cycles, the ways crops process nutrients, the environmental effects of fertilizer use and how this understanding can be used to improve nutrient use efficiency for a more resource-efficient and climate-smart agriculture.

CHAPTER TITLES

Part 1 Primary macronutrients: nitrogen; 1.Advances in understanding the nitrogen cycle in crop production; 2.Advances in understanding uptake and utilization of nitrogen in wheat; 3.Advances in optimising nitrogen-use efficiency in crop production; **Part 2 Primary macronutrients: phosphorus;** 4.Advances in understanding crop use of phosphorus; 5.Advances in understanding the environmental effects of phosphorus fertilization; 6.Enhancing phosphorus-use efficiency in crop production; **Part 3 Primary macronutrients: potassium;** 7.Advances in understanding the potassium cycle in crop production; 8.Potassium in crop physiology; 9.Advances in optimizing potassium-use efficiency in crop production; **Part 4 Secondary macronutrients and micronutrients;** 10.Secondary macronutrients: advances in understanding calcium cycling in soils, uptake/use by plants and ways of optimizing calcium-use efficiency in crop production; 11.The effect of soil organic matter on plant mineral nutrition; 12.Advances in understanding iron cycling in soils, uptake/use by plants and ways of optimising iron-use efficiency in crop production; 13.Current advances in zinc in soils and plants: implications for zinc efficiency and biofortification studies; 14.Advances in understanding boron cycling in soils, uptake/use by plants and ways of optimizing boron use efficiency in crop production;

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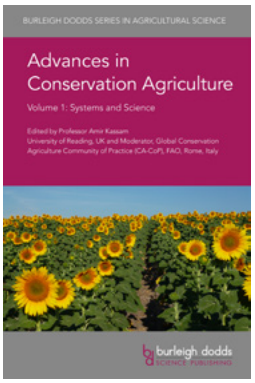

Advances in Conservation Agriculture

Volume 1: Systems and Science

Editor: Professor Amir Kassam, University of Reading, UK and Moderator, Global Conservation Agriculture Community of Practice (CA-CoP), FAO, Rome, Italy

By focussing on soil health, Conservation Agriculture (CA) is seen as more sustainable than conventional production. This volume summarises research on key components for successful CA including no-till techniques, soil cover and cropping systems as well as the role of livestock and agroforestry.

CHAPTER TITLES

1.The need for Conservation Agriculture; 2.Development of Conservation Agriculture systems globally; 3.Conservation Agriculture Systems: soil health and landscape management; 4.The role of no or minimum mechanical soil disturbance in Conservation Agriculture systems; 5.The role and management of soil mulch and cover crops in Conservation Agriculture systems; 6.The role of crop and cropping system management in Conservation Agriculture systems; 7.Management of vegetable Conservation Agriculture systems; 8.Managing perennial Conservation Agriculture systems: orchards, plantations and agroforestry; 9.Integration of crop-livestock in Conservation Agriculture systems; 10.Status of mechanization in Conservation Agriculture systems; 11.Certification schemes for Conservation Agriculture systems; 12.Institutional and policy support for Conservation Agriculture uptake

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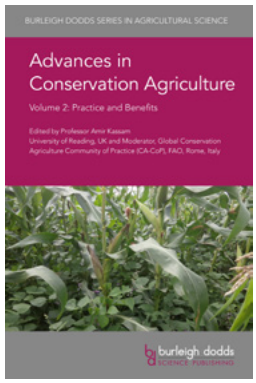

Advances in Conservation Agriculture

Volume 2: Practice and Benefits

Editor: Professor Amir Kassam, University of Reading, UK and Moderator, Global Conservation Agriculture Community of Practice (CA-CoP), FAO, Rome, Italy

Volume 2 reviews research on optimising Conservation Agricultural (CA) practices and their benefits. Chapters cover soil management, crop nutrition and irrigation, pest and disease management, as well as broader issues such as managing carbon, biodiversity and ecosystem services.

CHAPTER TITLES

1.Practice and benefits of Conservation Agriculture systems; 2.Crop and cropping systems management practices and benefits in Conservation Agriculture systems; 3.Soil management practices and benefits in Conservation Agriculture systems; 4.Weed management practices and benefits in Conservation Agriculture systems; 5.Insect pest and disease management practices and benefits in Conservation Agriculture systems: a case of push–pull practice; 6.Nutrient management practices and benefits in Conservation Agriculture systems; 7.Carbon management practices and benefits in Conservation Agriculture systems; 8.Carbon management practices and benefits in Conservation Agriculture systems: soil organic carbon fraction losses and restoration; 9.Biodiversity management practices and benefits in Conservation Agriculture systems; 10.Conservation Agriculture: climate change mitigation and adaptation benefits; 11.Benefits of Conservation Agriculture to farmers and society; 12.Social benefits of Conservation Agriculture systems; 13.Harnessing ecosystem services with Conservation Agriculture; 14.Rehabilitating degraded and abandoned agricultural lands with Conservation Agriculture systems

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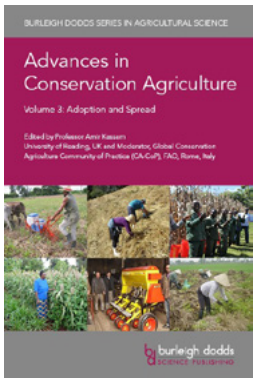

Advances in Conservation Agriculture

Volume 3: Adoption and Spread

Editor: Professor Amir Kassam, University of Reading, UK and Moderator, Global Conservation Agriculture Community of Practice (CA-CoP), FAO, Rome, Italy

Following on from previous volumes that discussed the systems, science, practice and benefits of CA, Volume 3 reviews the adoption and spread of CA in different regions around the world.

CHAPTER TITLES

1.State of the global adoption and spread of Conservation Agriculture; 2.Conservation Agriculture in West and Central Canada: an integrated review of adoption; 3.Conservation Agriculture in the USA; 4.Conservation Agriculture in Central America, the Caribbean and Mexico; 5.Conservation Agriculture in South America; 6.Conservation Agriculture in the agri-environmental European context; 7.Adoption and spread of Conservation Agriculture in North Africa; 8.Conservation Agriculture in West and Central Africa; 9.Conservation Agriculture in Eastern and Southern Africa; 10.From theory to practice: key lessons in the adoption of Conservation Agriculture in South Africa; 11.Conservation Agriculture in West Asia; 12.Adoption of Conservation Agriculture in Central Asia; 13.Conservation Agriculture in Eurasia; 14.Conservation Agriculture in South Asia; 15.Conservation Agriculture in Southeast Asia; 16.Adoption and spread of Conservation Agriculture in East Asia; 17.Conservation Agriculture in Australian dryland cropping and in New Zealand: the lessons of 70 years

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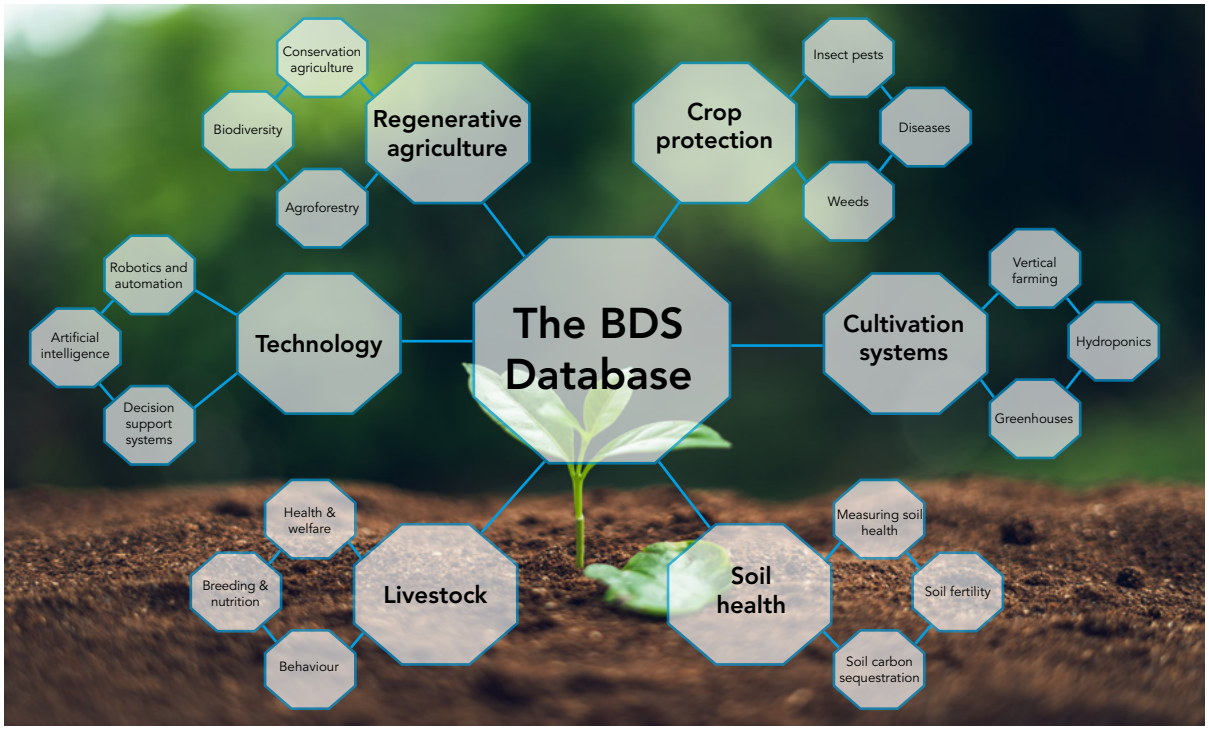

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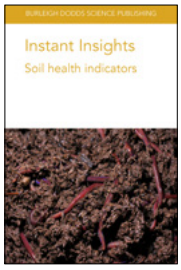

Soil health indicators

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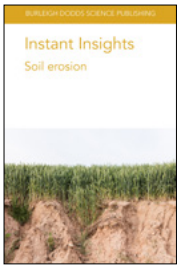

Soil erosion

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