



NUTRIENT USE IN CROP PRODUCTION

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EDITOR

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Ram Swaroop Meena



Nutrient Use In Crop Production:

Nutrient Use in Crop Production Zdenko Rengel, 2017-12-14 If you are an agronomist horticulturalist plant and soil scientist breeder or soil microbiologist you will want to read *Nutrient Use in Crop Production* to find everything you need to know about judicious nutrient management and maximizing nutrient utilization in the agricultural landscape In this book you will discover ways to minimize undesirable nutrient losses and techniques for preserving the environment while meeting the challenges of providing the earth's increasing population with sufficient food feed and fiber to sustain life Your existing knowledge base concerning this vital area of science will expand and grow as you become more open to the new ideas and applications contained in *Nutrient Use in Crop Production* Most importantly you will avoid the narrow scope found in most crop nutrition books and take a broader more globally minded view of how to maximize nutrient use and minimize nutrient losses in the soil of agricultural systems Specifically you will find these and other areas covered population growth food production and nutrient requirements managing soil fertility decline the role of nitrogen fixation in crop production delivering fertilizers through seed coatings micronutrient fertilizers the role of nutrient efficient crops in modern agriculture Feeding the world without depleting the world's viable soil nutrients is a monumental task but one that can be achieved as evidenced in the pages of *Nutrient Use in Crop Production* You and your circle of students professionals and administrators will benefit greatly from this in depth view of nutrient use in both developed and non industrialized countries to give you a better sense of how to allow both the world and the world's crops to grow

Nutrient Use in Crop Production Zdenko Rengel, 2017-12-14 If you are an agronomist horticulturalist plant and soil scientist breeder or soil microbiologist you will want to read *Nutrient Use in Crop Production* to find everything you need to know about judicious nutrient management and maximizing nutrient utilization in the agricultural landscape In this book you will discover ways to minimize undesirable nutrient losses and techniques for preserving the environment while meeting the challenges of providing the earth's increasing population with sufficient food feed and fiber to sustain life Your existing knowledge base concerning this vital area of science will expand and grow as you become more open to the new ideas and applications contained in *Nutrient Use in Crop Production* Most importantly you will avoid the narrow scope found in most crop nutrition books and take a broader more globally minded view of how to maximize nutrient use and minimize nutrient losses in the soil of agricultural systems Specifically you will find these and other areas covered population growth food production and nutrient requirements managing soil fertility decline the role of nitrogen fixation in crop production delivering fertilizers through seed coatings micronutrient fertilizers the role of nutrient efficient crops in modern agriculture Feeding the world without depleting the world's viable soil nutrients is a monumental task but one that can be achieved as evidenced in the pages of *Nutrient Use in Crop Production* You and your circle of students professionals and administrators will benefit greatly from this in depth view of nutrient use in both developed and non industrialized countries to give you a better sense of how to allow both the world and the world's crops to

grow **The Use of Nutrients in Crop Plants** Nand Kumar Fageria, 2016-04-19 Put Theory into Practice Scarcity of natural resources higher costs higher demand and concerns about environmental pollution under these circumstances improving food supply worldwide with adequate quantity and quality is fundamental Based on the author's more than forty years of experience *The Use of Nutrients in Crop Plants* *Nutrient Use Efficiency in Plants* Malcolm J. Hawkesford, Stanislav Kopriva, Luit J. De Kok, 2014-11-14 Nutrient Use Efficiency in Plants Concepts and Approaches is the ninth volume in the Plant Ecophysiology series It presents a broad overview of topics related to improvement of nutrient use efficiency of crops Nutrient use efficiency NUE is a measure of how well plants use the available mineral nutrients It can be defined as yield biomass per unit input fertilizer nutrient content NUE is a complex trait it depends on the ability to take up the nutrients from the soil but also on transport storage mobilization usage within the plant and even on the environment NUE is of particular interest as a major target for crop improvement Improvement of NUE is an essential prerequisite for expansion of crop production into marginal lands with low nutrient availability but also a way to reduce use of inorganic fertilizer *Achieving sustainable crop nutrition* Prof Zed Rengel, 2020-02-18 Focus on integrating research on nutrient cycling crop nutrient processing and the environmental impact of fertiliser use to identify ways of improving nutrient use efficiency NUE in the use of particular fertilisers Includes research on a range of secondary macronutrients and micronutrients including calcium magnesium zinc boron manganese and molybdenum Reviews a wide range of options for reducing optimising current levels of fertiliser use Mineral Nutrition of Crops Zdenko Rengel, 1999-06-18 The first book on crop nutrition that covers topics from soil hydrology to molecular biology The first book ever to elucidate so many different aspects of mineral nutrition of crops *Mineral Nutrition of Crops Fundamental Mechanisms and Implications* will allow you to grasp the complexity of the soil water plant microbe interactions governing nutrient uptake and utilization by crops By emphasizing a fundamental mechanistic approach this book effectively complements the monograph *Nutrient Use in Crop Production* The Haworth Press Inc With *Mineral Nutrition of Crops* you will explore the many facets necessary to increase crop and pasture yields and minimize unwanted losses of nutrients to the environment *Mineral Nutrition of Crops* covers a wide range of topics that span several scientific disciplines agriculture agronomy botany forestry ecology plant science and soil science From this book you will gain vital knowledge required to understand the complexity of mechanisms and processes governing nutrient transport toward roots including biological and chemical reactions influencing nutrient availability in the rhizosphere uptake by root cells long distance transport toward grain and the role of nutrients in metabolism Also you will explore issues relating to the following topics biology and chemistry of nutrient availability in the rhizosphere kinetics of nutrient uptake by plant cells role of mineral photosynthesis and yield formation importance of seed nutrient reserves in crop growth and development breeding crops for improved nutrient efficiency significance of root size for plant production monitoring water and nutrient fluxes down the profile From *Mineral Nutrition of Crops* you will gain the

knowledge you need to understand and improve methods of crop growth and nutrition Mineral Nutrition of Crops is an indispensable manual for anyone involved in the many aspects of growing crops **Improving Water and Nutrient-Use Efficiency in Food Production Systems** Zed Rengel,2013-01-03 Improving Water and Nutrient Use Efficiency in Food Production Systems provides professionals students and policy makers with an in depth view of various aspects of water and nutrient use in crop production The book covers topics related to global economic political and social issues related to food production and distribution describes various strategies and mechanisms that increase water and nutrient use efficiency and review the current situation and potential improvements in major food producing systems on each continent The book also deals with problems experienced by developed countries separately from problems facing developing countries Improving Water and Nutrient Use Efficiency emphasizes judicious water and nutrient management which is aimed at maximising water and nutrient utilisation in the agricultural landscape and minimising undesirable nutrient losses to the environment

Crops as Enhancers of Nutrient Use R Duncan,2012-12-02 Crops as Enhancers of Nutrient Use examines the various plant and soil factors that contribute to nutrient use efficiency of plants It attempts to address policies regarding Low Input Sustainable Agriculture LISA conservation oriented cropping systems and reductions in environmental contaminants It also presents longer term remedies to some of the inherent problems of high volume applications of expensive fertilizer nutrients This book emphasizes plant soil interaction particularly nutritional interactions involving rhizosphere microbes and stress on the root system Stress factors include moisture and low and high pH The book also covers the genetic and physiological response of plant to nutrients at the cellular level on a whole plant basis and when subjected to stress This book will contribute to the development of a more cost effective and judicious nutrient usage of major crops **Improving Water and Nutrient-Use Efficiency in Food Production Systems** Zed Rengel,2013-04-01 Improving Water and Nutrient Use Efficiency in Food Production Systems provides professionals students and policy makers with an in depth view of various aspects of water and nutrient use in crop production The book covers topics related to global economic political and social issues related to food production and distribution describes various strategies and mechanisms that increase water and nutrient use efficiency and review the current situation and potential improvements in major food producing systems on each continent The book also deals with problems experienced by developed countries separately from problems facing developing countries Improving Water and Nutrient Use Efficiency emphasizes judicious water and nutrient management which is aimed at maximising water and nutrient utilisation in the agricultural landscape and minimising undesirable nutrient losses to the environment *Nitrogen Management in Crop Production* Nand Kumar Fageria,2014-06-25 One of the main approaches for safeguarding food security sustainable development has increased demand for knowledge on fertilizer management in crop production Among essential plant nutrients nitrogen is one of the most important yield limiting nutrients mainly responsible for determining yield and yield components in cereals and legumes It is **Agriculture and the Nitrogen Cycle** Arvin

Mosier, J. Keith Syers, John R. Freney, 2013-04-10 Nitrogen is an essential element for plant growth and development and a key agricultural input but in excess it can lead to a host of problems for human and ecological health Across the globe distribution of fertilizer nitrogen is very uneven with some areas subject to nitrogen pollution and others suffering from reduced soil fertility diminished crop production and other consequences of inadequate supply Agriculture and the Nitrogen Cycle provides a global assessment of the role of nitrogen fertilizer in the nitrogen cycle The focus of the book is regional emphasizing the need to maintain food and fiber production while minimizing environmental impacts where fertilizer is abundant and the need to enhance fertilizer utilization in systems where nitrogen is limited The book is derived from a workshop held by the Scientific Committee on Problems of the Environment SCOPE in Kampala Uganda that brought together the world's leading scientists to examine and discuss the nitrogen cycle and related problems It contains an overview chapter that summarizes the group's findings four chapters on cross cutting issues and thirteen background chapters The book offers a unique synthesis and provides an up to date broad perspective on the issues of nitrogen fertilizer in food production and the interaction of nitrogen and the environment Nutrient Use Efficiency: from Basics to Advances

Amitava Rakshit, Harikesh Bahadur Singh, Avijit Sen, 2014-12-26 This book addresses in detail multifaceted approaches to boosting nutrient use efficiency NUE that are modified by plant interactions with environmental variables and combine physiological microbial biotechnological and agronomic aspects Conveying an in depth understanding of the topic will spark the development of new cultivars and strains to induce NUE coupled with best management practices that will immensely benefit agricultural systems safeguarding their soil water and air quality Written by recognized experts in the field the book is intended to provide students scientists and policymakers with essential insights into holistic approaches to NUE as well as an overview of some successful case studies In the present understanding of agriculture NUE represents a question of process optimization in response to the increasing fragility of our natural resources base and threats to food grain security across the globe Further improving nutrient use efficiency is a prerequisite to reducing production costs expanding crop acreage into non competitive marginal lands with low nutrient resources and preventing environmental contamination The nutrients most commonly limiting plant growth are N P K S and micronutrients like Fe Zn B and Mo NUE depends on the ability to efficiently take up the nutrient from the soil but also on transport storage mobilization usage within the plant and the environment A number of approaches can help us to understand NUE as a whole One involves adopting best crop management practices that take into account root induced rhizosphere processes which play a pivotal role in controlling nutrient dynamics in the soil plant atmosphere continuum New technologies from basic tools like leaf color charts to sophisticated sensor based systems and laser land leveling can reduce the dependency on laboratory assistance and manual labor Another approach concerns the development of crop plants through genetic manipulations that allow them to take up and assimilate nutrients more efficiently as well as identifying processes of plant responses to nutrient deficiency stress and

exploring natural genetic variation Though only recently introduced the ability of microbial inoculants to induce NUE is gaining in importance as the loss immobilization release and availability of nutrients are mediated by soil microbial processes

Phosphorus Management in Crop Production Nand Kumar Fageria, Zhenli He, Virupax C. Baligar, 2017-02-17 The world population is projected to reach nine billion by 2050 and in the coming years global food demand is expected to increase by 50% or more Higher crop productivity gains in the future will have to be achieved in developing countries through better natural resources management and crop improvement After nitrogen phosphorus P has more widespread influence on both natural and agricultural ecosystems than any other essential plant element It has been estimated that 5.7 billion hectares of land worldwide contain insufficient amounts of available P for sustainable crop production and P deficiency in crop plants is a widespread problem in various parts of the world However it has been estimated that worldwide minable P could last less than 40 years For sustaining future food supplies it is vital to enhance plant P use efficiency To bring the latest knowledge and research advances in efficient management of P for economically viable and environmentally beneficial crop production in sustainable agriculture *Phosphorus Management in Crop Production* contains chapters covering functions and diagnostic techniques for P requirements in crop plants P use efficiency and interactions with other nutrients in crop plants management of P for optimal crop production and environmental quality and basic principles and methodology regarding P nutrition in crop plants The majority of research data included are derived from many years of field greenhouse and lab work hence the information is practical in nature and will have a significant impact on efficient management of P fertilizers to enhance P use efficiency improve crop production promote sustainable agriculture and reduce P losses through eluviations leaching and erosion to minimize environmental degradation A comprehensive book that combines practical and applied information *Phosphorus Management in Crop Production* is an excellent reference for students professors agricultural research scientists food scientists agricultural extension specialists private consultants fertilizer companies and government agencies that deal with agricultural and environmental issues

The Role of Plant Roots in Crop Production Nand Kumar Fageria, 2012-07-23 *The Role of Plant Roots in Crop Production* presents the state of knowledge on environmental factors in root growth and development and their effect on the improvement of the yield of annual crops This book addresses the role of roots in crop production and includes references to numerous annual crops In addition it brings together the issues and the state of the art technologies that affect root growth with comprehensive reviews to facilitate efficient sustainable economical and environmentally responsible crop production Written for plant scientists crop scientists horticulturalists and soil scientists plant physiologists breeders environmental scientists agronomists and undergraduate and graduate students in different disciplines of agricultural science *The Role of Plant Roots in Crop Production* Addresses root architecture and development dynamics to help users improve crop productivity Emphasizes crop production plant nutrition and soil chemistry relative to root growth and functions Covers root morphology root functions nutrient and water uptake by roots root soil

interactions root environment interactions root microbe interactions physiology of root crops and management practices to improve root growth Supports content with experimental results and additional data is presented with pictures Increasing food production worldwide has become a major issue in the 21st century Stagnation in grain yield of important food crops in recent years in developed as well as developing countries has contributed to a sharp increase in food prices Furthermore higher grain yield will be needed in the future to feed a burgeoning world population with a rising standard of living that requires more grain per capita Technologies that enhance productivity ensure environmental safety and conserve natural resources are required to meet this challenge

Sustainable Crop Production Vijay Meena, Mahipal Choudhary, Ram Prakash Yadav, Sunita Kumari Meena, 2022-07-06 Sustainable Crop Production Recent Advances addresses various nutrient crop and soil management issues including recent advances in sustainable food production in the context of the changing climate Chapters present case studies on long term field experiments in specific locations with a focus on the state of the art of sustainable agriculture production systems

Crop Production Technologies Peeyush Sharma, Vikas Abrol, 2012-01-05 Crop production depends on the successful implementation of the soil water and nutrient management technologies Food production by the year 2020 needs to be increased by 50 percent more than the present levels to satisfy the needs of around 8 billion people Much of the increase would have to come from intensification of agricultural production Importance of wise usage of water nutrient management and tillage in the agricultural sector for sustaining agricultural growth and slowing down environmental degradation calls for urgent attention of researchers planners and policy makers Crop models enable researchers to promptly speculate on the long term consequences of changes in agricultural practices In addition cropping systems under different conditions are making it possible to identify the adaptations required to respond to changes This book adopts an interdisciplinary approach and contributes to this new vision Leading authors analyze topics related to crop production technologies The efforts have been made to keep the language as simple as possible keeping in mind the readers of different language origins The emphasis has been on general descriptions and principles of each topic technical details original research work and modeling aspects However the comprehensive journal references in each area should enable the reader to pursue further studies of special interest The subject has been presented through fifteen chapters to clearly specify different topics for convenience of the readers

Nutrient Dynamics for Sustainable Crop Production Ram Swaroop Meena, 2019-09-06 The cropping system is one of the important components of sustainable agriculture since it provides more efficient nutrient cycling As such balanced fertilization must be based on the concept of sustainable crop production Feeding the rapidly growing world population using environmentally sustainable production systems is a major challenge especially in developing countries A number of studies have highlighted the fact that degradation of the world's cultivated soils is largely responsible for low and plateauing yields Soil is lost rapidly but only formed over millennia and this represents the greatest global threat to nutrient dynamics in agriculture This means that nutrient management is essential to provide food and

nutritional security for current and future generations Nutrient dynamics and soil sustainability imply the maintenance of the desired ecological balance the enhancement and preservation of soil functions and the protection of biodiversity above and below ground Understanding the role of nutrient management as a tool for soil sustainability and nutritional security requires a holistic approach to a wide range of soil parameters biological physical and chemical to assess the soil functions and nutrient dynamics of a crop management system within the desired timescale Further best nutrient management approaches are important to advance soil sustainability and food and nutritional security without compromising the soil quality and productive potential Sustainable management practices must allow environmentally and economically sustainable yields and restore soil health and sustainability This book presents soil management approaches that can provide a wide range of benefits including improved fertility with a focus on the importance of nutrient dynamics Discussing the broad impacts of nutrients cycling on the sustainability of soil and the cropping systems that it supports it also addresses nutrient application to allow environmentally and economically sustainable agroecosystems that restore soil health Arguing that balanced fertilization must be based on the concept of INM for a cropping system rather than a crop it provides a roadmap to nutrient management for sustainability This richly illustrated book features tables figures and photographs and includes extensive up to date references making it a valuable resource for policymakers and researchers as well as undergraduate and graduate students of Soil Science Agronomy Ecology and Environmental Sciences

Biostimulants for sustainable crop production Prof Youssef Roupael, Prof Patrick du Jardin, Prof Patrick Brown, Prof. Stefania De Pascale, Prof Giuseppe Colla, 2020-07-28 The first comprehensive review of key advances in biostimulant research Covers key groups of biostimulants humic substances seaweed extracts protein hydrolysates silicon plant growth promoting rhizobacteria PGPR and arbuscular mycorrhizal fungi AMF Discusses key advances in research and practical applications of biostimulants in the field

[The Molecular and Physiological Basis of Nutrient Use Efficiency in Crops](#) Malcolm J. Hawkesford, Peter Barraclough, 2011-06-20 Efforts to increase efficient nutrient use by crops are of growing importance as the global demand for food fibre and fuel increases and competition for resources intensifies The Molecular and Physiological Basis of Nutrient Use Efficiency in Crops provides both a timely summary of the latest advances in the field as well as anticipating directions for future research The Molecular and Physiological Basis of Nutrient Use Efficiency in Crops bridges the gap between agronomic practice and molecular biology by linking underpinning molecular mechanisms to the physiological and agronomic aspects of crop yield These chapters provide an understanding of molecular and physiological mechanisms that will allow researchers to continue to target and improve complex traits for crop improvement Written by leading international researchers The Molecular and Physiological Basis of Nutrient Use Efficiency in Crops will be an essential resource for the crop science community for years to come Special Features coalesces current knowledge in the areas of efficient acquisition and utilization of nutrients by crop plants with emphasis on modern developments addresses future directions in crop

nutrition in the light of changing climate patterns including temperature and water availability bridges the gap between traditional agronomy and molecular biology with focus on underpinning molecular mechanisms and their effects on crop yield includes contributions from a leading team of global experts in both research and practical settings **Plant**

Macronutrient Use Efficiency Mohammad Anwar Hossain, Takehiro Kamiya, David Burritt, Lam-Son Phan Tran, Toru Fujiwara, 2017-07-27 Plant Macronutrient Use Efficiency presents an up to date overview of the latest research on the molecular and genetic basis of macro nutrient use efficiency NUE in plants and strategies that can be used to improve NUE and nutrient associated stress tolerance in crop plants Plant NUE is a measure of how efficiently plants use available nutrients and an understanding of plant NUE has the potential to help improve the use of limited natural resources and to help achieve global food security This book presents information important for the development of crop plants with improved macro NUE a prerequisite to reducing production costs expanding crop production into noncompetitive marginal lands with low nutrient resources and for helping to prevent environmental contamination Plant Macronutrient Use Efficiency provides a comprehensive overview of the complex mechanisms regulating macro NUE in crop plants which is required if plant breeders are to develop modern crop varieties that are more resilient to nutrient associated stress Identification of genes responsible for macro NUE and nutrient related stress tolerance in crop plants will help us to understand the molecular mechanisms associated with the responses of crop plants to nutrient stress This volume contains both fundamental and advanced information and critical commentaries useful for those in all fields of plant science research Provides details of molecular and genetic aspects of NUE in crop plants and model plant systems Presents information on major macronutrients nutrient sensing and signaling and the molecular and genomic issues associated with primary and secondary macronutrients Delivers information on how molecular genetic information associated with NUE can be used to develop plant breeding programs Includes contributions from world leading plant nutrition research groups

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