

Micro Irrigation In Arid And Semi Arid Regions Guidelines For Planning And Design

Irrigation Engineering and Hydraulic Structures comprehensively deals with all aspects of Irrigation in India, soil moisture and different types of irrigation systems including but not limited to Sprinkler, Tubewell, Canal and Micro-Irrigation. The book also focuses on Engineering Hydrology, Dams, Water Power Engineering as well as Irrigation Water Management. Special care has been taken to highlight the principles, practices and design procedures that have been widely recommended as well as suggest improvements in the application of existing methods and adoption of latest techniques used in other parts of the world.

It is a comprehensive treatise on Water Resources Development and Irrigation Management. For the last 30 years the book has enjoyed the status of a definitive textbook on the subject. It has now been thoroughly revised and updated, and thus substantially enlarged. In addition to the wholesale revision of the existing chapters, three new chapters have been added to the book, namely, 'Lift Irrigation Systems and their Design', 'Water Requirement of Crops and Irrigation Management', and 'Economic Evaluation of Irrigation Projects and Water Pricing Policy'. Applications of Furrow and Micro Irrigation in Arid and Semi-Arid Regions, the fifth volume in the Research Advances in Sustainable Micro Irrigation series, addresses the ever-challenging need for irrigation systems in arid and semi-arid regions of the world, areas that are suffering from severe water shortages. These areas, such as Egypt, Tunisia, most of Africa, and parts of South America, Central America, and Australia, find it a struggle to grow crops sustainably with the water available. This important book emphasizes sustainable agriculture practices to promote increased water usage efficiency in dry areas for growing of crops. It presents a variety of research and studies on such topics as: • Meteorological instruments for water management • Buried micro irrigation laterals for soil water retention • Water vapor flux models • Performance of various crops grown under different irrigation methods • Scheduling of irrigation • Phyto-monitoring techniques This valuable book is a must for those finding it a challenge to maintain sustainable crop production in the midst of continuous water shortages in areas where water is not naturally plentiful. With contributions from authors with hands-on experience in the field, the book will be an invaluable reference and guide to effective micro irrigation methods.

This Encyclopedia of Land Use, Land Cover and Soil Sciences is a component of the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. Land is one of our most precious assets. It represents space, provides food and shelter, stores and filters water, and it is a base for urban and industrial development, road construction, leisure and many other social activities. Land is, however not unlimited in extent, and even when it is physically available its use is not necessarily free, either because of natural limitations (too cold, too steep, too wet or too dry, etc.) or because of constraints of access or land tenure. This 7-volume set contains several chapters, each of size 5000-30000 words, with perspectives, applications and extensive illustrations. It carries state-of-the-art knowledge in the fields of Land Use, Land Cover and Soil Sciences and is aimed, by virtue of the several applications, at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Micro irrigation, also known as trickle, drip, localized, high frequency, or pressurized irrigation, is an irrigation method that saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters. It is done through narrow tubes that deliver water directly to the base of the plant. Clogging is a menace in the success of drip irrigation systems, and the situation is more complex under subsurface drip irrigation. Irrigation planners and engineers have found a variety of innovative methods to help to minimize clogging. This book emphasizes the implications of micro irrigation clogging, especially under the subsurface placement of laterals. The book offers remedies to decrease clogging and methodologies to improve the performance of micro sprinklers. This valuable resource addresses this critical problem, covering: Challenges in clogging under subsurface drip irrigation Principles, practices, and management of emitter clogging Efficiency of acidification for unclogging of emitters Performance characteristics of micro sprinklers The book will serve as a reference manual for professionals in biological and civil engineering, horticulture, soil and crop science, and agronomy, as well as for graduate and undergraduate students in related fields. It will be a valuable reference for professionals who work with micro irrigation/wastewater and water management and for technical agricultural centers, irrigation centers, agricultural extension services, and other agencies that work with micro irrigation programs.

This new volume in the Innovations and Challenges in Micro Irrigation series covers an array of technologies to estimate evapotranspiration and to evaluate parameters that are needed in the management of micro irrigation, with worldwide applicability to irrigation management in agriculture. Topics include recent evapotranspiration research, performance evaluation of filters and emitters, evaluation of fertigation and ground water with treated wastewater effluent, performance of pulse drip irrigated potato under organic agriculture practices in sandy soils, impact of polyethylene mulch on micro irrigated cabbage, and tree injection irrigation.

Many countries around the world are struggling with the challenges of water scarcity, including water for crops. Micro irrigation methods are an effective means to make the most efficient use of available water. This volume, Micro Irrigation Scheduling and Practices, continues the efforts of the book series Innovations and Challenges in Micro Irrigation to provide informative and comprehensive knowledge on micro irrigation methods and practices. This new book presents some of the latest information and research on micro irrigation and covers the area of performance, practices, and design, focusing particularly on the performance of vegetable, fruit and row crops in conjunction with different scheduling and practices. Irrigation scheduling is an important water management strategy, and this book addresses scheduling methods and issues. Design aspects of micro irrigation systems have also been discussed in the book. The authors present their research and studies on scheduling practices and design micro irrigation systems with a variety of fruits and vegetables, including peppers, chili, watermelon, oranges, banana, litchi, rice, sugarcane, sorghum, and marigolds. Micro Irrigation Scheduling and Practices will serve as a valuable reference for researchers, water resources professionals, agricultural extension agencies, farmers, and faculty and students.

The recent technologies for sustainable development and maintaining ecological integrity in the field of agriculture, forestry and environmental management for the green future. Describes the recent technologies and issues to generate awareness among the global scientific community towards sustainable development. Covers various eco-friendly approaches for successful management of soil, water, forest, agriculture, and other natural resources. Addresses the policy issues promoting conservation, protection and management of various natural resources. Presents the issues of climate change and sustainable strategies to combat such a mega event. The existence of life on the earth primarily depends upon the agriculture, forest and environment. The changing climate is imposing the multifaceted challenges in front of human civilization. The agroecosystem management practices and technologies leads to higher productivity with destruction of agricultural, forest and environmental habitat leading to soil-water-air pollution. Food and Agriculture Organization (FAO) plays a key role in the promoting research and developmental activities in various sectors to achieve the sustainable development goals under 2030 agenda. Gradual growth of science and technology has imposed a significant pressure on the different ecosystem. In this context, approaches such as sustainable agriculture, forestry and eco-friendly technologies need to be address across the world. Keeping view of these facts this book underlines scientific chapters dealing with the issues with proper explanation, and accompanied by illustrative diagrams, tables, database as required. The editors have tried to provide a brief scenario about the current issues related to the agriculture, forestry and environment. Therefore, the book would be a very useful resource for academicians, scientists, and policy makers of the related field.

Initially associated with hi-tech irrigated agriculture, drip irrigation is now being used by a much wider range of farmers in emerging and developing countries. This book documents the enthusiasm, spread and use of drip irrigation systems by smallholders but also some disappointments and disillusion faced in the global South. It explores and explains under which conditions it works, for whom and with what effects. The book deals with drip irrigation 'behind the scenes', showcasing what largely remain 'untold stories'. Most research on drip irrigation use plot-level studies to demonstrate the technology's ability to save water or improve efficiencies and use a narrow and rather prescriptive engineering or economic language. They tend to be grounded in a firm belief in the technology and focus on the identification of ways to improve or better realize its potential. The technology also figures prominently in poverty alleviation or agricultural modernization narratives, figuring as a tool to help smallholders become more innovative, entrepreneurial and business minded. Instead of focusing on its potential, this book looks at drip irrigation-in-use, making sense of what it does from the perspectives of the farmers who use it, and of the development workers and agencies, policymakers, private companies, local craftsmen, engineers, extension agents or researchers who engage with it for a diversity of reasons and to realize a multiplicity of objectives. While anchored in a sound engineering understanding of the design and operating principles of the technology, the book extends the analysis beyond engineering and hydraulics to understand drip irrigation as a sociotechnical phenomenon that not only changes the way water is supplied to crops but also transforms agricultural farming systems and even how society is organized. The book provides field evidence from a diversity of interdisciplinary case studies in sub-Saharan Africa, the Mediterranean, Latin America, and South Asia, thus revealing some of the untold stories of drip irrigation.

This important book—the only complete, one-stop manual on microirrigation worldwide—offers knowledge and techniques necessary to develop and manage a drip/trickle or micro irrigation system. The simplicity of the contents facilitates a technician to develop an effective micro irrigation system. Management of Drip/Trickle or Micro Irrigation includes the basic considerations relating to soil-water-plant interactions, with topics such as methods for soil moisture measurement; evapotranspiration; irrigation systems; tensiometer use and installation; principles of drip/ micro/ trickle irrigation; filtration systems; automation; chlorination; service and maintenance; design of drip irrigation and lateral lines; the evaluation of uniformity of application; and an economical analysis for selecting irrigation technology.

This book contains 14 separately authored chapters on the pricing of irrigation water. The chapters are entitled: (1) Water pricing in irrigation: the lifetime of an idea; (2) Water pricing in irrigation: mapping the debate in the light of experience; (3) Why is agricultural water demand unresponsive at low price ranges; (4) Get the prices right: a model of water prices and irrigation efficiency in Maharashtra, India; (5) Thailand's free water: rationale for a water charge and policy shifts; (6) Water rights and water fees in rural Tanzania; (7) Who will pay for water? The Vietnamese State's dilemma of decentralization of water management in the Red River Delta; (8) Water pricing in Haryana, India; (9) The energy-irrigation nexus in South Asia: groundwater conservation and power sector viability; (10) Wells and canals in Jordan: can pricing policies regulate irrigation water use; (11) Water pricing in Tadla, Morocco; (12) Water pricing policies and recent reforms in China: the conflict between conservation and other policy goals; (13) Water pricing and irrigation: a review of the European experience; and (14) Policy-driven determinants of irrigation development and environmental sustainability: a case study in Spain.

Applications of Furrow and Micro Irrigation in Arid and Semi-Arid Regions CRC Press

Micro Irrigation Management: Technological Advances and Their Applications, the fifth book in the Innovations and Challenges in Micro Irrigation book series, is a valuable reference volume on micro irrigation and water management for professional training institutes, technical agricultural centers, irrigation centers, agricultural extension service, and other agencies who work with micro irrigation programs. With an international focus, this new book focuses on applications of solar energy in micro irrigation and other important technological advances. It includes case studies and illustrative examples on drip irrigation design.

Management, Performance, and Applications of Micro Irrigation Systems, the fourth volume in the Research Advances in Sustainable Micro Irrigation series, emphasizes sustainable and meaningful methods of irrigation to counter rampant water scarcity. In many parts of the world, this scarcity significantly affects crop yield, crop quality, and, consequently, human quality of life. This important volume presents the best management practices in sustainable micro irrigation, with the goal of increasing crop yield and quality and conserving water. The practices described are practical and attainable and are based on research and studies from many areas of the world, including India, South Africa, and other areas. The applications described can be adapted and applied to many regions with a critical need to address the water crisis in crop production. The practices and applications presented include: • Partial root-zone surface drip irrigation • Effective maintenance techniques • Web-based irrigation scheduling • Water use efficiency methods • The use of flushing and filtration systems This valuable book is a must for those struggling to find ways to address the need to maintain efficient crop production in the midst of water shortages. With chapters from hands-on experts in the field, the book will be an invaluable reference and guide to effective micro irrigation methods.

This book takes stock of micro irrigation systems (MIS), the technological intervention in India's agricultural and water management sectors, over the past couple of decades. Based on empirical research from the major agriculturally dynamic states, viz., Gujarat, Rajasthan, Maharashtra, Tamil Nadu, Andhra Pradesh and Karnataka, the book provides a nuanced understanding and objective assessment of the implementation and adoption of MIS across these states. It addresses several of the questions related to adoption and impacts of MIS in India. On the adoption side, the key question that the book addresses is which segment of the farming community adopts MIS across states? The impacts analysed include those on physical, agronomic and economic aspects. At the macro level, the question being asked is about the future potential of MIS in terms of saving water from agriculture and making more water available for environment. The book also addresses the question of the positive/negative externalities and real social benefits and costs from the use of MIS, a major justification for heavy capital subsidies for its purchase by farmers. It also brings out certain critical concerns pertaining to MIS adoption, which need to be addressed through more empirical research based on longitudinal panel/ cross sectional data. The book would be of great use to researchers (agricultural water management, irrigation economics), students of water resource engineering, irrigation engineering and water resources management, as well as to policy makers and agricultural water management experts – national and international.

The Handbook of Irrigation System Selection for Semi-Arid Regions compares the various types of available irrigation systems for different regions and conditions, and explains how to analyze field data to determine the suitability of the land for surface, sprinkle, or drip irrigation systems. The book focuses on strategies for irrigation development and management and examines deficit irrigation and partial root-zone drying systems. Also, solute leaching modeling under different irrigation systems, soil moisture conditions, and organic fertilizer application in arid areas are discussed. Further, it examines multi-criteria decision making for irrigation management and the appraisal of agricultural lands for irrigation in hot, sub-humid regions. Features: Presents comparative analysis to aid in the selection of the most appropriate types of

irrigation systems according to land characteristics. Includes numerous practical case studies. Offers parametric evaluation systems for irrigation purposes. Considers data from semi-arid zones, each with different sub-climates. Focusing on semi-arid land, the book highlights parametric evaluation systems for irrigation purposes, along with the use of analytical hierarchy processes integrated with GIS to determine which systems are best suited. This comprehensive and well-illustrated handbook will be of great interest to students, professionals, and researchers involved with all aspects of irrigation in semi-arid regions.

This important volume, the ninth in the Research Advances in Sustainable Micro Irrigation book series, provides an invaluable addition to the literature and knowledge on the ever-growing need for sustainable irrigation for agricultural crops in many water-scarce parts of the world. The book specifically covers advances in fertigation for water management in general as well as for specific crops, such as peaches, maize, and citrus crops. Specific topics include: • The design of various surface and subsurface water emitters • Using information from weather stations for irrigation purposes • Ultra low drip irrigation technology • The management of weeds in crops using micro irrigation • New technology and advances in fertigation With chapters from researchers and practitioners in agricultural engineering, water research and technology, soil conservation, and other fields, this compendium provides a wealth of useful information that can be put into practice to enhance crop production.

Rapid prototyping (RP) technology has been widely known and appreciated due to its flexible and customized manufacturing capabilities. The widely studied RP techniques include stereolithography apparatus (SLA), selective laser sintering (SLS), three-dimensional printing (3DP), fused deposition modeling (FDM), 3D plotting, solid ground curing (SGC), multiphase jet solidification (MJS), laminated object manufacturing (LOM). Different techniques are associated with different materials and/or processing principles and thus are devoted to specific applications. RP technology has no longer been only for prototype building rather has been extended for real industrial manufacturing solutions. Today, the RP technology has contributed to almost all engineering areas that include mechanical, materials, industrial, aerospace, electrical and most recently biomedical engineering. This book aims to present the advanced development of RP technologies in various engineering areas as the solutions to the real world engineering problems.

Contributed articles.

This book focuses on best management practices for drip irrigated crops. It cover irrigation methods, scheduling of micro irrigation, and mulching and crop performance. Micro irrigation techniques with diverse crops are discussed, including sweet pepper, chili, tomatoes, cauliflower, wheat, sweet peas, sugarcane, and potatoes. The performance of the various techniques has been tested and evaluated in the field. Written by experts on micro irrigation, this valuable book is a must-have for micro irrigation professionals as well as advanced students.

Summary: Contributed articles.

Drought is a natural hazard characterized by lower than expected or lower than normal rainfall having slow but widespread impact. This book focus on drought management and mitigation in agriculture and allied sectors. The chapters cover Basic concepts, assessment, monitoring, forecasting, early warning, vulnerability and adaptation to drought and mitigation and management strategies. Management of different land use systems under drought and finally socio economic impact and livelihood issues of drought are also focussed. It would be useful to a wide range of stakeholders, i.e. planners, researchers, students and interested public. This will also serve as text book as well as supplementary reading for courses in agronomy, ecology, geography and agro meteorology besides administration and disaster management units.

This valuable book, the third volume in the Research Advances in Sustainable Micro Irrigation series, focuses on sustainable micro irrigation management for trees and vines. It covers the principles as well as recent advances and applications of micro irrigation techniques.

Specialists throughout the world share their expertise on: • Automation of micro irrigation systems • Service and maintenance of micro irrigation systems • Evaluation of micro irrigation systems • Scheduling of irrigation • Using municipal wastewater for micro irrigation • Micro-jet irrigation and other systems • The effect of potassium, acid lime, and other elements

Farmers have always played a significant role in our society as they provide the worlds population with food. However, one may forget that, not only do they provide food but they also provide energy, which nowadays, is of paramount importance, especially as in light of renewable energies. Indeed, farmers can produce energy from the wind, the sun or the biomass and they can use it for their own farm, or, if they have a surplus, resell it to companies. In many rural areas, particularly in developing and emerging countries, the access to the electricity grid is not always assured. In this situation, farmers cannot depend on the traditional irrigation system. As a result, using an independent and alternative energy system can be a solution for the farmer to secure a safe power source and for the public grid to avoid saturation. Solar energy might be one of the easiest ways for farmers to produce energy. This book examines the potential of solar energy and other evolving energy technologies in micro irrigation to create sustainable energy sources. It discusses various innovative micro irrigation system designs, with a special emphasis on solar energy and photovoltaic (PV) energy. It also deliberates nutrient management through drip irrigation to improve yield and quality of crops. This text will be of valuable information tool for those working in urban development, energy professionals, advanced graduate students, as well as researchers and practitioners. These days, R&D tends to emphasis on generating solar pumps that are inexpensive in arid regions. Therefore, in countries which suffer from high temperatures and rare water resources, the drip irrigation system could contribute to an efficient water management. This is all the more important as farmers have to face three challenges: save water, money and energy. Although these systems are still quite expensive and complicated to settle, many R&D projects are working on the democratization of the use of solar power in agriculture, which, in the prospect (and even today), could play a vibrant part in the management of the food and energy emergency.

The book Irrigation Systems and Practices in Challenging Environments is divided into two interesting sections, with the first section titled Agricultural Water Productivity in Stressed Environments, which consists of nine chapters technically crafted by experts in their own right in their fields of expertise. Topics range from effects of irrigation on the physiology of plants, deficit irrigation practices and the genetic manipulation, to creating drought tolerant variety and a host of interesting topics to cater for the those interested in the plant water soil atmosphere relationships and agronomic practices relevant in many challenging environments, more so with the onslaught of global warming, climate change and the accompanying agro-meteorological impacts. The second section, with eight chapters, deals with systems of irrigation practices around the world, covering different climate zones apart from showing casing practices for sustainable irrigation practices and more efficient ways of conveying irrigation waters - the life blood of agriculture, undoubtedly the most important sector in the world.

This book introduces state-of-the-art approaches, methods and research, focusing on smart management of rainwater. In addition, it provides an overview of projects from across the world, illustrating how rainwater-smart management has been implemented in drylands. Focusing on the scientific perspective it demonstrates how rural dryland agriculture can be improved. It also documents the wealth of rainwater-smart know-how available today, and replicates and transfers results to other countries and regions, to encourage cross-sector interactions among various stakeholders, such as practitioners from governmental and public organisations, policy- and decision-makers, and teaching staff from academic scientific institutions. The contributors showcase vital lessons learned from research, field projects and best-practice examples. They address the integrated use of rainwater harvesting management with landscape restoration practices and water-, and climate-smart agriculture for food security and poverty alleviation in arid and semi-arid areas. Original research, combined with the contributors' synthetic approach, lays a foundation for new concepts and ideas. Through case studies and research reports, the book discusses all the relevant issues necessary for the comprehensive analysis and successful implementation of the technologies in rainwater management. Highlighting the working principles and technical recommendations with regard to cost-efficient rainwater-smart solutions, it is of interest to practitioners. It

is also a valuable resource for academic specialists, professionals and students, since many development agencies are funding rainwater harvesting for irrigation purposes.

Management Strategies for Water Use Efficiency and Micro Irrigated Crops presents new research and technologies for making better use of water resources for agricultural purposes. The chapters focus on better management to improve allocation and irrigation water efficiency and look at performance factors as well. Chapters look at irrigation technology, environmental conditions, and scheduling of water application. One section of the book focuses on water management in the cultivation of sugarcane, a very important industrial crop used in many fields. Other sections are devoted to principles and challenging technologies, water use efficiency for drip-irrigated crops, performance of fertigated rice under micro irrigation, and evaluation of performance of drip-irrigated crops. This valuable book is a must for those struggling to find ways to address the need to maintain efficient crop production in the midst of water shortages. With chapters from hands-on experts in the field, the book will be an invaluable reference and guide to effective micro irrigation methods.

Microirrigation has become the fastest growing segment of the irrigation industry worldwide and has the potential to increase the quality of food supply through improved water fertilizer efficiency. This book is meant to update the text "Trickle Irrigation, Design, Operation and Management". This text offers the most current understanding of the management criteria needed to obtain maximum water and fertilization efficiency. * Presents a detailed explanation of system design, operation, and management specific to various types of MI systems * Analyzes proper use of irrigation technology and its effect to increase efficiency * Provides an understanding to the basic science needed to comprehend operation and management * Over 150 figures of designs and charts of systems including, surface drip, subsurface drip, spray/microsprinkler, and more

The reuse of wastewater in irrigation is being practiced only recently to solve water scarcity problems in agriculture. Management of water, soil, crop, and operational procedures, including precautions to protect farm workers, play an important role in the successful use of sewage effluent for irrigation. Appropriate water management practices must be followed to prevent salinization. If salt is not flushed out of the root zone by leaching and removed from the soil by effective drainage, salinity problems can build up rapidly. Leaching and drainage are, thus, two important water management practices to avoid salinization of soils. One of the options that may be available to farmers is the blending of treated sewage with conventional sources of water to obtain a blended water of acceptable salinity level. This important book focuses on the use of wastewater as a valuable resource for agricultural micro irrigation purposes. It covers effective wastewater management practices in a variety of climates, including semi-arid regions and others; how to perform effective evaluations to gauge the quality of the water on plants, including potatoes, maize, and eggplant; and the cost-benefit of using wastewater. It addresses the sources of wastewater for irrigation and the problems along with challenges, including water quality, clogging, soil quality, and more. The mission of this compendium is to serve as a reference manual for professionals in biological and civil engineering, horticulture, soil and crop science, and agronomy, as well as for graduate and undergraduate students in related fields. It will be a valuable reference for professionals who work with micro irrigation/wastewater and water management, for technical agricultural centers, irrigation centers, agricultural extension services, and other agencies that work with micro irrigation programs.

This new book, Sustainable Micro Irrigation Design Systems for Field Crops: Practices and Theory, is unique because it is complete and simple, a one-stop manual, with worldwide applicability to irrigation management in agriculture. It brings together the best research for efficient micro irrigation methods for field crops from around the world. Its coverage of the field of micro irrigation includes • An historical review • A review of the current status and potential applications of micro irrigation • Basic principles and applications • Research results for vegetable/row/tree crops • Research results on simulation of micro irrigation and wetting patterns • A discussion on the development of software for micro irrigation design • Information geared specifically for micro irrigation for small farms and marginal farmers • Design charts for micro irrigation methods in arid, humid, semiarid, and tropical climates • Methods and techniques that can be easily applied to other locations that are not covered here This book offers basic practices and design methods of drip/trickle or micro irrigation design that are necessary to understand before designing, developing, and evaluating an agricultural drip irrigation management system. This book is a must for those interested in irrigation planning and management, namely, researchers, scientists, educators, and students.

The book entitled Water Quality, Soil and Managing Irrigation of Crops comprises three sections, specifically: Reuse Water Quality, Soil and Pollution which comprises five technical chapters, Managing Irrigation of Crops with four, and Examples of Irrigation Systems three technical chapters, all presented by the respective authors in their own fields of expertise. This text should be of interest to those who are interested in the safe reuse of water for irrigation purposes in terms of effluent quality and quality of urban drainage basins, as well as to those who are involved with research into the problems of soils in relation to pollution and health, infiltration and effects of irrigation and managing irrigation systems including basin type of irrigation, as well as the subsurface method of irrigation. The many examples are indeed a semblance of real world irrigation practices of general interest to practitioners, more so when the venues of these projects illustrated cover a fair range of climate environments.

This new book, Principles and Practices of Sustainable Micro Irrigation, is the first in the new series on micro irrigation, which offers a vast amount of knowledge and techniques necessary to develop and manage a drip/trickle or micro irrigation system. Written by experienced scientists from various parts of the world, the chapters in this book offer basic principles, knowledge, and techniques of micro irrigation management, which are essential in designing, developing, and evaluating an agricultural irrigation management system. The methods and techniques have worldwide applicability to irrigation management in agriculture. The book includes coverage of many important topics in the field, including: • An historical review of micro irrigation • The current global status of the field and its potential • Basic principles and applications • New research on chemigation and fertigation • Technologies for specific crops, such as sugar cane • Irrigation software for micro irrigation design • Affordable and low-cost micro irrigation solutions for small farms and farms in developing countries • Micro irrigation design using Hydrocalc software This book is a must for those interested in irrigation planning and management, namely, researchers, scientists, educators, and students.

Microirrigation history and research trends; Non-traditional uses of microirrigation; Hydraulic design and analysis of microirrigation systems; Microirrigation with saline water; Subsurface drip irrigation; Fertigation and management of microirrigation systems; Sensors and controls in microirrigation; Chemigation and water treatment for microirrigation; Microirrigation alternatives to limited water supplies; Microirrigation of turf and landscapes; Standards and international developments; International status and experiences with microirrigation; Subsurface drip irrigation; Design and management of microirrigation systems; Design and management of microirrigation systems; International status and experiences with microirrigation; Microirrigation of fruit crops; Microirrigation in vegetable crop systems; Water and energy conservation with microirrigation; Microirrigation in container and greenhouse production; Water filtration for microirrigation; Soil, plant and water relationships with microirrigation; Microirrigation of row crops; Products and developments in microirrigation; Microirrigation for crop production; Uniformity in microirrigation systems; Scheduling of microirrigation system; One-on-one poster presentations.

This book outlines a new paradigm, Sustainable Intensification of Crop Production (SICP), which aims to produce more from the same area of land by increasing efficiency, reducing waste, conserving resources, reducing negative impacts on the environment and enhancing the provision of ecosystem services. The use of ecologically based management strategies can increase the sustainability of agricultural production while reducing off-site consequences. The book also highlights the underlying principles and outlines some of the key management practices and technologies – such as minimum soil disturbance; permanent organic soil covers; species diversification;

selection of suitable cultivars, planting time, age and spacing; balanced plant nutrition; agro-ecological pest management; efficient water management; careful management of farm machinery; and integrated crop-livestock production – required to implement SICP. The green revolution (by using high-yielding crop varieties, mono-cropping, fertilization, irrigation, and pesticides) has led to enormous gains in food production and improved world food security. In many countries, however, intensive crop production has had negative impacts on production, ecosystems and the larger environment, putting future productivity at risk. In order to meet the projected demands of a growing population expected to exceed 9 billion by 2050, farmers in the developing world must double food production, a challenge complicated by the effects of climate change and growing competition for land, water and energy. This book will be of immense value to all members of the scientific community involved in teaching, research and extension activities concerning sustainable intensification. The material can be used for teaching post-graduate courses, or as a useful reference guide for policy makers.

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