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Technical Bulletin
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Evapotranspiration
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Annotated Bibliography on the Effects of Irrigation Practices on Stream Water Quality with Emphasis on Salinity and Pesticides
Agricultural Water Management

GABRIELLE WEBB

Technical Bulletin CRC Press
This book fills the need for an up-to-date comprehensive text on irrigation water management for students of agriculture both at the undergraduate and postgraduate levels. The scope of the book makes it a useful reference for courses in agricultural engineering, agronomy, soil science, agricultural physics and environmental sciences. It can also serve as a valuable guidebook to persons working with farming communities.The coverage in fifteen chapters brings out different aspects of irrigation including irrigation situation in the world, rainfall, evaporation, water wealth and progressive development of irrigation in India, measurement of soil water and irrigation water, methods of irrigation, irrigation with saline water, formulating cropping pattern in irrigated area and management of high water table.
Determining Consumptive Use and Irrigation Water Requirements BoD – Books on Demand
This book was designed to be a comprehensive review of selected topics related to irrigation and drainage. Readers will find themes such as salinity control, decision support systems, subsurface drainage, irrigation scheduling in nurseries, irrigation with municipal wastewater, and sustainable drainage systems. These topics and pursuant discussions are expected to be very fruitful in the continuing debate on global food security.
Water Use Efficiency for Irrigated Turf and Landscape CSIRO PUBLISHING
The loss of water from lakes, rivers, oceans, vegetation, and the earth, as well as man-made structures such as reservoirs and irrigation conduits, is a major concern of hydrologists and irrigation specialists. This loss, compounded by the lack of usable water in some areas, indicates a need for field and laboratory research that will contribute to the understanding of the processes and parameters that comprise and contribute to evaporation.This book emphasizes the process of the air-water interface and discusses such important topics as evaporation and condensation coefficients of water, heat and mass transfer, surface temperature, interfacial tension, convection, diffusion, thermal gradients, wind-generated waves, and the roles that these processes play in evaporation. The book also discusses

subjects such as methods for suppressing evaporation using films, water vapor distribution, wind tunnel investigations, evaporation from water drops, preparation of pure water, molecular diffusion, the eddy-correlation method, and evaporation estimation methods. The book will be of considerable value to hydrologists, irrigation specialists, meteorologists, civil engineers, chemical engineers, hydraulic engineers, water resources specialists, water conservation specialists, geophysicists, environmental engineers, and anyone interested in understanding the evaporation of water and its consequences.

Evapotranspiration and Irrigation Water Requirements Elsevier

The report computes different components of potential crop water demand at the canal command level in Indus Basin. Major contribution is update of water demand based on several years of climate data, which improves the estimation of reference evapotranspiration for developing refined crop coefficients based on the latest cropping patterns. The water demands of major crop and fully developed standard unit for each canal command is presented for direct comparisons and adjustments, if required. The report is part of Indus Basin performance study, which aims to identify the scope for integrated land and water management by evaluating current practices to propose sustainable alternatives.

A Method for Estimating Evapotranspiration for Use in Determining Water Requirements of an Irrigation Project Springer Science & Business Media

This book covers topics on the basic models, assessments, and techniques to calculate evapotranspiration (ET) for practical applications in agriculture, forestry, and urban science. This simple and thorough guide provides the information and techniques necessary to develop, manage, interpret, and apply evapotranspiration ET data to practical applications. The simplicity of the contents assists technicians in developing ET data for effective water management.

A Manual Springer Science & Business Media

Woody plants such as trees have a significant economic and climatic influence on global economies and ecologies. This completely revised classic book is an up-to-date synthesis of the intensive research devoted to woody plants published in the second edition, with additional important aspects from the authors' previous book, Growth Control in Woody Plants. Intended primarily as a reference for researchers, the interdisciplinary nature of the book makes it useful to a broad range of scientists and researchers from agroforesters, agronomists, and arborists to plant pathologists and soil scientists. This third edition provides crutial updates to many chapters, including: responses of plants to elevated CO2; the process and regulation of cambial growth; photoinhibition and photoprotection of photosynthesis; nitrogen metabolism and internal recycling, and more. Revised chapters focus on emerging discoveries of the patterns and processes of woody plant physiology. * The only book to provide recommendations for the use of specific management practices and experimental procedures and equipment *Updated coverage of nearly all topics of interest to woody plant physiologists * Extensive

revisions of chapters relating to key processes in growth, photosynthesis, and water relations * More than 500 new references * Examples of molecular-level evidence incorporated in discussion of the role of expansion proteins in plant growth; mechanism of ATP production by coupling factor in photosynthesis; the role of cellulose synthase in cell wall construction; structure-function relationships for aquaporin proteins

Geological Survey Water-supply Paper Amer Society of Civil Engineers

This publication is intended to provide guidance in determining crop water requirements and their application in planning, design and operation of irrigation projects; Part I.1 presents suggested methods to derive crop water requirements. The use of four well-known methods for determining such requirements is defined to obtain reference crop evapotranspiration (ETo), which denotes the level of evapotranspiration for different set of climatic data. To derive the evapotranspiration for a specific crop, relationships between crop evapotranspiration (ETcrop) and reference crop evapotranspiration (ETo) are given in Part I.2 for different crops, stages of growth, length of growing season and prevailing climatic conditions. The effect of local conditions on crop water requirements is given in Part I.3; this includes local variation in climate, advection, soil water availability and agronomic and irrigation methods and practices. Calculation procedures are presented together with examples. A detailed discussion on selection and calibration of the presented methodologies together with the data sources is given in Appendix II. A computer programme on applying the different methods is given in Appendix III. Part II discusses the application of crop water requirements data in irrigation project planning, design and operation. Part II. 1 deals with deriving the field water balance, which in turn forms the basis for predicting seasonal and peak irrigation supplies for general planning purposes. Attention is given to irrigation efficiency and water requirements for cultural practices and leaching of salts. In Part II. 2 methods are presented to arrived at field and scheme supply schedules with emphasis towards the field water balance and field irrigation management. Criteria are given for operating the canal system using different methods of water delivery, and for subsequent design parameters of the system. Suggestions are made in Part II. 3 on refinement of field and project supply schedules once the project is in operation. The presented guidelines are based on measured data and experience obtained covering a wide range of conditions. Local practical, technical, social and economic considerations will, however, affect the planning criteria selected. Therefore caution and a critical attitude should still be taken when applying the presented methodology.

A Report of the Central Valley Water Use Study Committee CRC Press

Since the beginning of its formation approximately three billion years ago, the hydrosphere - as an envelope of the terrestrial ellipsoid - has remained constant from a quantitative point of view. The hydrosphere modifies only the ratio of the stretches of the planetary ocean and land, including the proportion of the states of water aggregation: gaseous, liquid, and solid.The hydrological cycle transports only a portion of the hydrosphere, repeats itself annually, and presents itself as a huge

planetary plant that for billions of years has operated uninterruptedly on the basis of solar energy and gravity, providing freshwater resources for the maintenance and perpetuation of life beyond the planetary ocean.Water resources are highly influenced by the hydrologic cycle and play a role in agricultural economic development. However, as is shown by the Intergovernmental Panel on Climate Change report, the phenomena of changing climate and land use are set to exacerbate an already serious situation of water supply for various users. In this context, scientific investigations into the issue of the sustainable use of water are timely and important. Improvement of water management involves the accurate estimation of consumptive uses. The purpose of this book is to show the achievements of scientists and academicians all over the world in promoting and sharing new issues on various topics related to evapotranspiration.

A Research Summary : Technical Completion Report Evaporation, Evapotranspiration, and Irrigation Water Requirements

This Task Committee report provides standardized equations for calculating reference evapotranspiration (ET) from weather data and procedures for quality assessment and control of weather data. The purpose of the standardized reference ET equation and calculation procedures is to bring commonality to the calculation of reference ET and to provide a standardized basis for determining or transferring crop coefficients for agriculture and landscape use. The basis of the standardized reference ET equation is the ASCE Penman-Monteith (ASCE-PM) method Manual 70. Along with applications for the ASCE-PM method, this report includes recommended calculations for vapor pressure, net radiation and wind speed adjustment, and guidelines on assessing weather data integrity and estimating values for missing data. The development of this standardized report by the Environmental and Water Resources Committee (EWRI) of ASCE, was made at the request of, and has been endorsed by, the Irrigation Association.

Spatial distribution of reference and potential evapotranspiration across the Indus Basin Irrigation Systems Springer Science & Business Media

Evaporation, Evapotranspiration, and Irrigation Water RequirementsAmerican Society of Civil EngineersEvapotranspiration and Irrigation Water RequirementsA ManualDetermining Consumptive Use and Irrigation Water RequirementsEvapotranspirationPrinciples and Applications for Water ManagementCRC Press

Irrigation Water Use in the Central Valley of California BoD – Books on Demand

This report contains a collection of papers from a workshop---Strengthening Science-Based Decision-Making for Sustainable Management of Scarce Water Resources for Agricultural Production, held in Tunisia. Participants, including scientists, decision makers, representatives of non-profit organizations, and a farmer, came from the United States and several countries in North Africa and the Middle East. The papers examined constraints to agricultural production as it relates to water scarcity; focusing on 1) the state of the science regarding water management for agricultural purposes in the Middle East and North Africa 2) how

science can be applied to better manage existing water supplies to optimize the domestic production of food and fiber. The cross-cutting themes of the workshop were the elements or principles of science-based decision making, the role of the scientific community in ensuring that science is an integral part of the decision making process, and ways to improve communications between scientists and decision makers.

Water Requirements for Irrigation and the Environment American Society of Civil Engineers

Irrigated agriculture produces about 40% of all food and fibre on about 16% of all cropped land. As such, irrigated agriculture is a productive user of resources; both in terms of yield per cropped area and in yield per volume of water consumed. Many irrigation projects, however, use (divert or withdraw) much more water than consumed by the crop. The non-consumed fraction of the water may cause a variety of undesirable effects ranging from water-logging and salinity within the irrigated area to downstram water pollution. This book discusses all components of the water balance of an irrigated area; evapotranspiration (Ch.2), effective precipitation (Ch.3) and capillary rise from the groundwater table (Ch.4). Chapter 5 then combines all components into a water management strategy that balances actual evapotranspiration (and thus crop yield) with the groundwater balance of the irrigated area (for a substainable environment). Chapter 6 presents CRIWAR 3.0, a simulation program that combines all water balance components into a single simulation procedure. The chapter describes the use of the CRIWAR software for developing water requirement tables and other useful information based on the selected water management strategy. This version greatly expands upon the capabilities of previously published programs.

Advanced Evapotranspiration Methods and Applications National Academies Press

Advances in Irrigation, Volume 1 covers updated comprehensive elucidations of the various topics of contemporary interest and importance related to the rapidly advancing science and engineering practice of irrigation. The book presents articles on the conjunctive use of rainfall and irrigation in semiarid regions; the theory and the practical aspects of irrigation scheduling; and canopy temperature and crop water stress. The text also includes articles on the use of solute transport models to estimate salt balance below irrigated cropland; level-basin irrigation; as well as the applications of flow measurement flumes to irrigation water management. The principles, practices, and potentialities of trickle (drip) irrigation are also encompassed. Hydraulic engineers and people working in the field of irrigation will find the book useful.

Encyclopedia of Agrophysics CRC Press

Achieving high water use efficiency in maintaining turf, trees and landscape areas is a core responsibility of open space managers. Water Use Efficiency for Irrigated Turf and Landscape provides a logical and scientifically sound approach to irrigation in urban areas in Australia. It is based on green space delivering defined outcomes using the principles of water sensitive urban design and irrigation efficiency. The book covers all stages of the water pathway – from the source to delivery into the plant root zone. Major topics include system

planning, estimating water demand, water quality, irrigation systems, soil management and irrigation performance evaluation. Clearly presented explanations are included, as well as line drawings and worked examples, and a plant water use database covering more than 250 plant species. A Water Management Planning template is included to guide water managers and operators through a process that will deliver a sound plan to achieve sustainable turf, urban trees and landscapes. Best Management Practice Irrigation principles are outlined and their implementation in open space turf and landscape situations is explained. The benefits and limitations of the various methods of delivering water to plants are covered, together with case studies and guidelines for specific horticultural situations. Methodologies to evaluate irrigated sites are included along with recommended benchmark values. The book presents the latest irrigation technology, including developments in water application, control technology and environmental sensors such as weather stations, soil moisture sensors and rain sensors.

Physiology of Woody Plants PHI Learning Pvt. Ltd.

This Encyclopedia of Agrophysics will provide up-to-date information on the physical properties and processes affecting the quality of the environment and plant production. It will be a "first-up" volume which will nicely complement the recently published Encyclopedia of Soil Science, (November 2007) which was published in the same series. In a single authoritative volume a collection of about 250 informative articles and ca 400 glossary terms covering all aspects of agrophysics will be presented. The authors will be renowned specialists in various aspects in agrophysics from a wide variety of countries. Agrophysics is important both for research and practical use not only in agriculture, but also in areas like environmental science, land reclamation, food processing etc. Agrophysics is a relatively new interdisciplinary field closely related to Agrochemistry, Agrobiology, Agroclimatology and Agroecology. Nowadays it has been fully accepted as an agricultural and environmental discipline. As such this Encyclopedia volume will be an indispensable working tool for scientists and practitioners from different disciplines, like agriculture, soil science, geosciences, environmental science, geography, and engineering.

PRINCIPLES AND PRACTICE Water Resources Publication

Make the best use of available water for your crops! Water Use in Crop Production explores innovative methods that determine how much water certain crops need, in certain climates, in order to ensure adequate plant growth and help eliminate water waste. Through this informative book, agronomists, growers, researchers, and graduate students will find methods and techniques for effective water management that will save money and conserve water. Water Use in Crop Production will enable you enhance crop quality and quantity and save one of the earth's most important resource. Comprehensive and thorough, this essential book combines two vital needs, food and water, and examines what must be done in order to keep up with the ever-growing human population. Explaining conservation techniques used in Argentina, Australia, Israel, Morocco, New Zealand, the Philippines, Spain, and the United States, Water Use in Crop Production will help

you achieve this goal as it discusses water management measures including: avoiding excessive deep percolation reducing runoff lessening water evaporation through methods such as reducing the capillary water flow to the surface of the soil determining the rates at which water is demanded and can be supplied in a specific area to create a plan for limiting water loss studying the root structure of plants to calculate how much water they need using deficit irrigation to help plants save water for future use evaluating citrus water use through the Penman-Monteith model Containing charts, tables, and examples of the concepts it discusses, this book is the culmination of the latest studies on water storage. Water Use in Crop Production provides you with reliable strategies and methods that will help you lessen water expenditures and improve the vitality of crops anywhere in the world.

Fundamentals of Irrigation and On-farm Water Management: Volume 1

Ideal Thoughts

IRRIGATION FUNDAMENTALS is a comprehensive text on the basic principles and practices of applied agricultural irrigation. Written over a period of more than 10 years, it is based on the authors'' extensive experience in farming, consulting, research, teaching, and other related agricultural activities. The book is for use by teachers of introductory courses in irrigation, farmers who have some basic technical knowledge, and for administrators who need a general understanding of irrigation as an aid for policy decisions in water resource development and planning. Various factors that influence crop yield and production including climate, fertility, water, drainage, and agronomic practices are addressed. The various irrigation methods such as border, basin, contour, furrow, sub, sprinkle, and drip or trickle are described; and conditions are given for selection of the appropriate method to use. Recent developments and new technology are included herein when they have obvious practical applications, but for the most part the material presented in this book is based on well established principles and practices. Much of the content is very practical and much is essentially nontechnical. Nevertheless, some of the material covered in this book goes beyond the basic concepts in an attempt to better describe the relationships and techniques employed by irrigation scientists and irrigation engineers.From the Preface: The future of the world depends very much on how we manage natural resources. Since the year 1900 there has been a ninefold increase in global carbon emissions from burning fossil fuels, and the world population has increased about 3.7 times in this century. Vast areas of forests have been destroyed, and irrigated lands now produce 40% of the food supply. Due to depletion of groundwater reserves and an increase in population, irrigated area per capita is declining. Consequently, the irrigation of additional alluvial lands is a strategic necessity for all of humankind. Much of the alluvial lands cannot be made productive without prior development of water resources through flood control, drainage, and irrigation. The production of electricity through hydropower and the production of alcohol fuel from irrigated crops, as has been practiced for many years in Brazil, can slow the increase in carbon emissions. Such diverse developments are typically not separable; rather, they must be considered as integral parts of a

comprehensive development plan. The conservation of natural resources and increasing productivity of irrigated lands are also strategic necessities. Much of the current technology is highly transferable and crop yields can be significantly increased on lands already under irrigation.The authors have worked in many countries in connection with resource inventories, teaching, and the planning, development and use of irrigation as a tool for increasing production and providing employment. They have written extensively and have been honored for their achievements. They have considerable experience with everything from primitive low-technology irrigation developments to highly developed irrigation in the USA and in dozens of countries around the world. Both of the authors have dedicated their careers to teaching, research, and consulting in agricultural irrigation and water resources development and planning. It is their hope and expectation that this book will provide incentives for investigating and documenting land and water resources, improving development, increasing crop yields, conserving resources, and improving the environment. From the Table of Contents:Chapt. 1 - INTRODUCTION: Irrigation Fundamentals: - - A Definition of Irrigation - - Statistical Perspectives of Agricultural IrrigationChapt. 2 - FACTORS INFLUENCING CROP PRODUCTION: - - Introduction - - Temperature, Radiation, and Evaporative Potential - - Climate Change - - Soil Fertility and Fertilizers - - Water Availability and Distribution - - Soil Aeration and Drainage - - Plant Density, Spacing and Leaf Area Index - - Crop VarietyChapt. 3 - AGRICULTURAL SOILS: - - Introduction - - Soil Texture and Structure - - Soil Classification and Evaluation - - Bureau of Reclamation Land Classification - - Soil Age and Topography - - Soil Chemistry - - Infiltration Rates - - Soil-Water Relationships - - Equations for Soil Water Content - - Soil Water Potential - - Measuring Soil Water ContentChapt. 4 - EVALUATING IRRIGATION RESOURCES: - - Introduction - - Climate - - Hydrology - - Human and Other Factors - - Integrated DevelopmentChapt. 5 - IRRIGATION METHODS: - - Introduction - - Graded Border Irrigation - - Basin Irrigation - - Contour Levees - - Furrow Irrigation - - Sub-Irrigation - - Sprinkle Irrigation - - Drip or Trickle Irrigation - - Selecting an Irrigation Method - - Land Grading and Leveling - - Laser-Leveling Equipment and Practices - - Computing Diagonal Slopes - - Irrigation System EvaluationChapt. 6 - CROP WATER REQUIREMENTS: - - Introduction - - Direct Methods - - Indirect Methods - - Potential Evaporation - - Reference Evapotranspiration - - Extraterrestrial Solar Radiation - - Irrigation Requirements - - Crop CoefficientsChapt. 7 - IRRIGATION SCHEDULING: - - Introduction - - Allowable Water Depletion - - Monitoring Soil Water - - Scheduling Irrigations - - Rice Irrigation

District Report Academic Press

Agriculture is one of the few industries that has been creating resources conti-ously from nature. Sustainability of this industry is a crucial issue at now-a-days. Agricultural technologies are important to feed the growing world population. Agricultural engineering has been applying scienti?c principles for the optimal use of natural resources in agricultural production for the bene?t of humankind. The role of agricultural engineering is increasing in the coming days at the forthcoming challenges of producing more food with less water

coupled with climate uncertainty. I am happy to know that a book entitled "Fundamentals of Irrigation and On-farm Water Management", written by Engr. Dr. M. H. Ali, is going to be p- lished by Springer. The book is designed to cover the major ?elds of agricultural and environmental engineering such as weather, plant, soil, water, and basics of on-farm water management. The book will be quite useful for the students of agricultural engineering. Students of other related branches of engineering s- ences, and engineers working in the ?eld and at research institutes will also be beni?ted. The book may serve as a text book for the students and as a practical hand-book for the practitioners and researchers in the ?eld of irrigation and on-farm water management. Utilization of the recent literature in the area and citation of relevant journals / reports have added a special value to this book. Considering the topics covered, engineers, scientists, practitioners, and educators will ?nd this book as a valuable resource.

Consumptive Use of Water and Irrigation Water Requirements IWMI

Calculation of crop evapotranspiration; Selection of crop coeficient; Calculation of field irrigation requirements.

Water Use in Crop Production

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