

PLANT SCIENCE/ AGRICULTURE

# SOILLESS CULTURE

THEORY AND PRACTICE

EDITED BY:

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During the second half of the twentieth century, soilless crop production advanced from primitive mimics of conventional agriculture, to highly advanced technical systems and methods. Plant production in hydroponics and soilless culture is one of the fastest changing facets of agriculture, rapidly expanding throughout the world, raising a considerable interest in the scientific community. For the first time an authoritative reference book covers both theoretical and practical aspects of growing plants without the use of soil.

**Soilless Culture** provides the reader with a thorough understanding of the physical and chemical properties of the various soilless growing media and how these properties affect plant performance in relation to basic horticultural operations such as irrigation and fertilization. It describes the current knowledge in relation to technical equipment and methods in soilless production systems, both for traditional run-to-waste systems and recirculated systems. An entire chapter is devoted to management of re-circulated systems. Another chapter covers issues related to plant protection in soilless media, with emphasis on closed systems. For the first time in the scientific literature an entire chapter is devoted to analysis of growing media.

In addition to serving the needs of scientists, this book is also particularly relevant for agronomists, horticulturalists, greenhouse and nursery managers, extension specialists, and people involved with the production of plants in soilless systems.



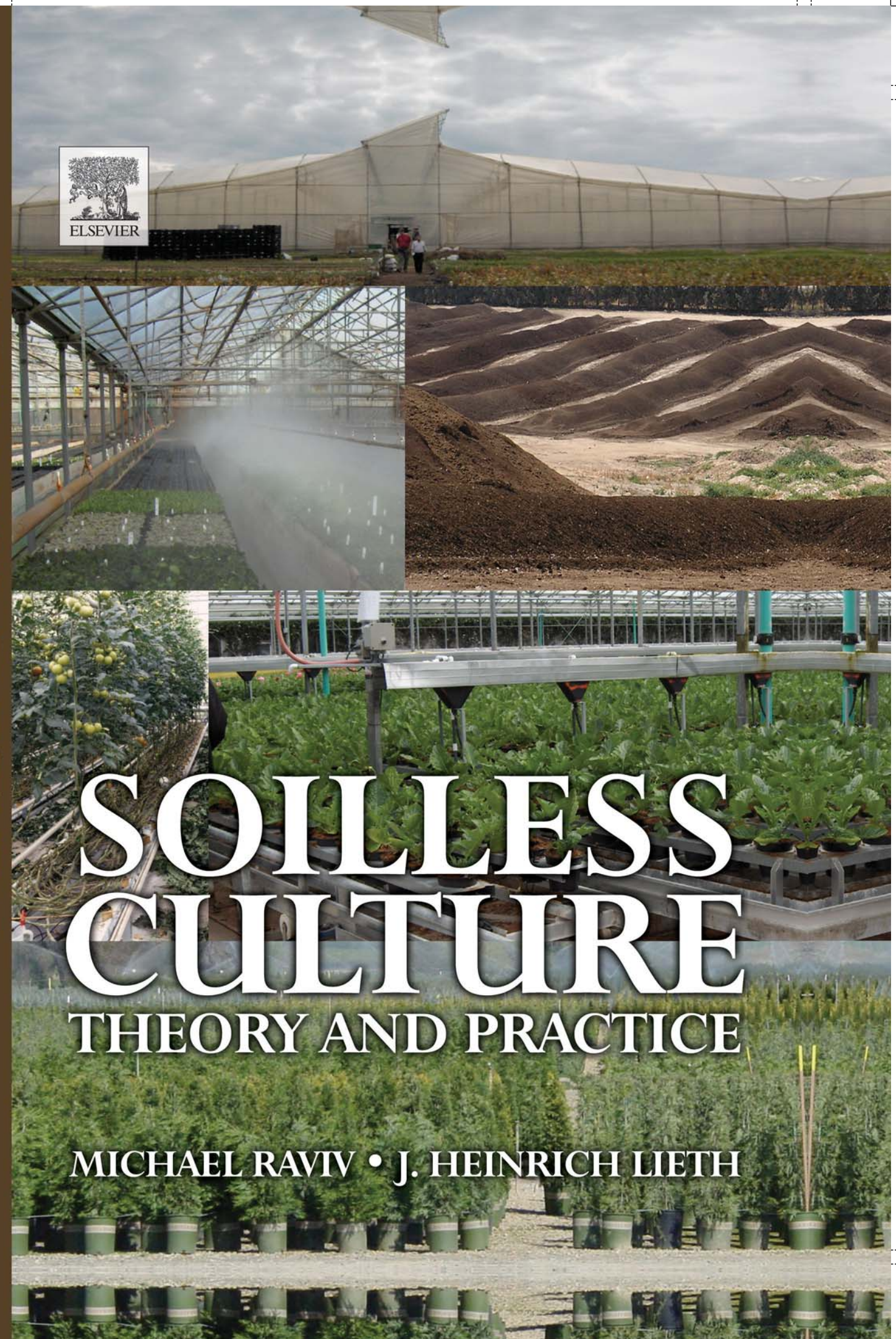
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MICHAEL RAVIV • J. HEINRICH LIETH



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# PREFACE

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Since the onset of the commercial application of soilless culture, this production approach has evolved at a fast pace, gaining popularity among growers throughout the world. As a result, a lot of information has been developed by growers, advisors, researchers, and suppliers of equipment and substrate. With the rapid advancement of the field, an authoritative reference book is needed to describe the theoretical and practical aspects of this subject. Our goal for this book is to describe the state-of-the-art in the area of soilless culture and to suggest directions in which the field could be moving. This book provides the reader with background information of the properties of the various soilless media, how these media are used in soilless production, and how this drives plant performance in relation to basic horticultural operations such as irrigation and fertilization.

As we assemble this book, we are aware that many facets of the field are rapidly changing so that the state-of-the-art is continuing to advance. Several areas in particular are in flux. Two such factors are (1) the advent of governmental pressures to force commercial soilless production systems to recirculate irrigation effluent and (2) a desire for society to use fewer agricultural chemicals in food production. The group of authors that have contributed to this book are all aware of these factors, and their contributions to this book attempt to address the state-of-the-art.

This book should serve as reference book or textbook for a wide readership including researchers, students, greenhouse and nursery managers, extension specialists; in short, all those who are involved in the production of plants and crops in systems where the root-zone consists of soilless media or no media at all. It provides information concerning the fundamental principles involved in plant production in soilless culture and, in addition, may serve as a manual that describes many of the useful techniques that are constantly emerging in this field.

In preparing this book, we were helped by many authorities in the various specialized fields that are covered. Each chapter was reviewed confidentially by

prominent scholars in the respective fields. We take this opportunity to thank these colleagues who contributed their time and expertise to improve the quality of the book. The responsibility, however, for the content of the book is the authors' and editors'.

For both of us, the assembly of this book has been an arduous task in which we have had numerous discussions about the myriad of facets that make up this field. This has served to stimulate for us a more in-depth respect for the field and a deeper appreciation for our many colleagues throughout the world. We are very appreciative of all the work that our authors invested to make this book the highest quality that we could achieve, and hope that after all the repeated requests from us for various things, that they are still our friends.

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