SOILS AND OTHER GROWTH MEDIA

Science in Horticulture Series

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ISBN 978-1-349-01208-4 ISBN 978-1-349-01206-0 (eBook)
DOI 10.1007/978-1-349-01206-0

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First published 1975 by
THE MACMILLAN PRESS LTD
London and Basingstoke
Associated companies in New York Dublin
Melbourne Johannesburg and Madras

SBN 333 12571 1

Set I.B.M. by
GEORGE OVER LIMITED, LONDON AND RUGBY

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PREFACE

It is well established that plants can be raised to maturity without the assistance of soils, yet most plants are (and will be for the foreseeable future) grown on soils or similar growth media. A good understanding of the basic physical and chemical principles underlying the soil processes that contribute to plant growth facilitates the intelligent use of the soil, one of our major natural resources.

This book has been written primarily for students of horticulture and agriculture in universities and colleges, who are embarking on their first and probably only course in soil science. It presents the modern views on the chemical and physical aspects of soils as the environment of plant roots on a molecular scale, together with an up-to-date evaluation of field soils and currently used growth media. The biological and biochemical aspects of soil science are not considered here in detail because of lack of space.

The book is in two parts. Part I, Basic Principles, starts with a discussion of the microstructure of soil materials, concentrating on the components of the finely divided (or clay) fraction, and continues with a description of the structure and properties of the microcrystalline clay minerals, the amorphous inorganic and organic soil materials and clay-organic complexes. This is followed by a discussion of the pore space, which contains soil water and soil air, and constitutes the molecular environment of roots. Soil water is in contact with and is replenished from the soil solid phase, and contains in ionic form the nutrients required by plants. The next chapter is a discussion of the ionic components in the environment of plant roots. Part II, Horticultural Principles, opens with a discussion of the macroscopic structure and composition of soils and other growth media. The management of soils is then discussed from the physical, chemical and biological points of view.

A book of limited size covering a wide field is necessarily selective; moreover, such selection is bound to be subjective to a certain extent. Attention has been concentrated on fundamental principles; these are presented critically where it was thought desirable. The authors have drawn on a large body of knowledge accumulated by many workers in the soil sciences whom it is impossible to acknowledge individually; most of those to whom the authors are indebted appear in the bibliography, where key references are listed together with suggestions for further reading. We are grateful to the Editor of the series, Professor L. Broadbent, for his interest and encouragement, and to our wives who have helped with the preparation of the manuscript.

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