

Roots, Nutrient and Water Influx, and Plant Growth

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Foreword

Plant growth depends on an intricate interaction of soil factors, atmospheric factors, and plant genotype. An understanding of this soil-plant-atmosphere complex is necessary if the yields of field, horticultural, and forest plants are to be increased. The aerial portion of plants has received most of the attention of researchers over the years, while the root system has received considerably less focus.

This publication describes some recent studies on plant roots. The eight authors have presented a broad coverage of the subject from basic mechanisms to an overview of the role of roots in determining crop yields.

The American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America are pleased to have sponsored the symposium and this resultant publication entitled *Roots, Nutrient and Water Influx, and Plant Growth*.

K. J. Frey, President
American Society of Agronomy

W. F. Keim, President
Crop Science Society of America

D. R. Nielsen, President
Soil Science Society of America

Preface

Plant and soil science meet at the root-soil interface. In recent years, we have recognized that root and soil interact at this interface so that the soil solution composition at the root-soil interface is different from bulk soil solution and hence influences the interpretation of soil chemical studies. This effect is influenced by nutrient influx kinetics and the size and morphology of the root system. Within the last 30 years, progress has been made toward understanding these complex soil-root-crop interactions. This publication is, firstly, a clear recognition of the importance of the subject and, secondly, a summary of the present state of knowledge. The 1982 program chairman for Div. S-4, Soil Fertility and Plant Nutrition, D. L. Grunes, asked S. A. Barber to organize a symposium on this subject for the annual meeting held in Anaheim, CA in 1982. The symposium was cosponsored by Div. C-2 and S-4 of the American Society of Agronomy. Six scientists, actively doing research with plant roots, in different areas were invited to give 30-min presentations and to prepare manuscripts for publication. A large attendance at the symposium indicated a significant interest in soil-plant interactions.

This publication, *Roots, Nutrient and Water Influx, and Plant Growth*, is the written version of the papers presented at the symposium. The first chapter by André Läuchli discusses our current knowledge on ion absorption mechanisms of plant roots. The second chapter by A. J. M. Smucker develops the recent knowledge on C flow from the shoot to the root, the use of the C by the root and C exudate from the root. The third chapter by M. G. Huck treats water absorption kinetics for roots growing in soil. In the fourth chapter, S. A. Barber and M. Silberbush discuss root morphology and use a mechanistic model to evaluate its significance. Then, P. H. Nye discusses the role of the root in altering soil properties so that they affect ion uptake. In the final chapter, D. A. Brown and H. D. Scott give an overview of the significance of plant roots in determining crop yield.

We are grateful for the conscientious efforts of the authors in preparing their chapters. The chapters will be important for stimulating interdisciplinary cooperation among soil and plant scientists in an area that will have increasing significance.

Editors
Stanley A. Barber
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