

# Contents

Preface	ix
---------	----

## ROOTS IN AN ECOLOGICAL CONTEXT

<b>J.L. Harper, M. Jones &amp; N.R. Sackville Hamilton.</b> The evolution of roots and the problems of analysing their behaviour	3
--	---

## METHODOLOGY

<b>L.A. Mackie-Dawson &amp; D. Atkinson.</b> Methodology for the study of roots in field experiments and the interpretation of results	25
--	----

<b>C.A.G. Sackville Hamilton, J.M. Cherrett, J.B. Ford, G.R. Sagar &amp; R. Whitbread.</b> A modular rhizotron for studying soil organisms: construction and establishment	49
--	----

<b>R. Fogel &amp; J. Lussenhop.</b> The University of Michigan Soil Biotron: a platform for soil biology research in a natural forest	61
---	----

<b>N.R. Sackville Hamilton, M. Jones &amp; J.L. Harper.</b> Automated analysis of roots in bulk soil	69
--	----

<b>E. Steen.</b> Usefulness of the mesh bag method in quantitative root studies	75
---	----

## ROOT DEMOGRAPHY AND FUNCTIONING

<b>R. Fogel.</b> Root system demography and production in forest ecosystems	89
---	----

<b>D. Robinson.</b> Roots and resource fluxes in plants and communities	103
---	-----

<b>R. Habib &amp; F. Lafolie.</b> Water and nitrate redistribution in soil as affected by root distribution and absorption	131
--	-----

<b>N. Kachi &amp; I.H. Rorison.</b> Root and shoot activity of two grasses with contrasted growth rates in response to low nutrient availability and temperature	147
--	-----

- R.G.A. Boot & M. Mensink.** The influence of nitrogen availability on growth parameters of fast- and slow-growing perennial grasses 161

### ROOT RESPONSES TO SOIL CONDITIONS

- M.J. Goss.** Consequences of the activity of roots on soil 171
- J. Berthelin, C. Leyval, F. Laheurte & P. de Giudici.** Involvement of roots and rhizosphere microflora in the chemical weathering of soil minerals 187
- P. Bottner, J. Cortez & Z. Sallih.** Effect of living roots on carbon and nitrogen of the soil microbial biomass 201
- M.S. Davies.** Effects of toxic concentrations of metals on root growth and development 211
- A.H. Fitter.** The ecological significance of root system architecture: an economic approach 229

### THE ROOT SYSTEM OF DIFFERENT VEGETATION TYPES

- A.-C. Hansson, O. Andrén & E. Steen.** Root production of four arable crops in Sweden and its effect on abundance of soil organisms 247
- P.J. Goodman.** Root turnover and nitrogen cycling in low input grass/clover ecosystems 267
- C. Matthew, J.X. Xia, A.C.P. Chu, A.D. Mackay & J. Hodgson.** Relationship between root production and tiller appearance rates in perennial ryegrass (*Lolium perenne* L.). 281
- C.A.G. Sackville Hamilton & J.M. Cherrett.** The development of clover and ryegrass root systems in a pasture and their interactions with the soil fauna 291
- M. Dumortier.** Below-ground dynamics in a wet grassland ecosystem 301
- T.V. Callaghan, A.D. Headley & J.A. Lee.** Root function related to the morphology, life history and ecology of tundra plants 311
- M. Scholand, F.A. Austenfeld & D.J. Von Willert.** Underground biomass and its influence on soil shear strength in a grazed and an ungrazed German coastal marsh 341
- P.W. Rundel & P.S. Nobel.** Structure and function in desert root systems 349

## ROOT SYSTEMS AND PLANT INTERSPECIFIC EFFECTS

<b>J.P. Grime, B.D. Campbell, J.M.L. Mackey &amp; J.C. Crick.</b> Root plasticity, nitrogen capture and competitive ability	381
<b>D. Vaughan &amp; B.G. Ord.</b> Extraction of potential allelochemicals and their effects on root morphology and nutrient contents	399
<b>M.M. Caldwell, J.H. Richards &amp; W. Beyschlag.</b> Hydraulic lift: ecological implications of water efflux from roots	423
<b>E.I. Newman.</b> The role of root-inhabiting fungi in mixed-species plant communities	437
<b>V.K. Brown &amp; A.C. Gange.</b> Effects of root herbivory on vegetation dynamics	453
Index	471