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Carbon Forms and Functions in Forest Soils

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William W. McFee and J. Michael Kelly

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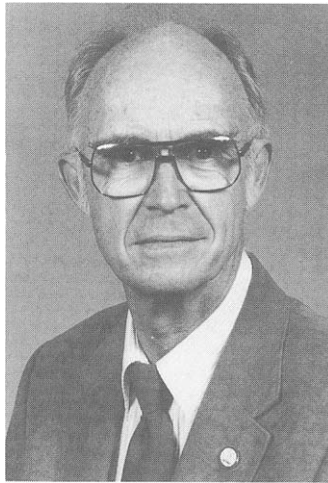
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DEDICATION

Charles (Chuck) B. Davey, Professor Emeritus, North Carolina State University, has had a distinguished career in forest soils. Since receiving his Ph.D. from the University of Wisconsin in 1955, he has directed the work of 50 some graduate students, been named outstanding teacher, served as President of the Soil Science Society of America, been consultant to forestry organizations in ten countries, produced over 120 refereed publications and been a prominent leader among forest soil scientists. We are proud to dedicate this volume to an effective educator, distinguished scientist, and esteemed colleague.



Charles (Chuck) B. Davey

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FOREWORD

There is a renewed public awareness of the importance of forests and forest lands for agriforestry, biodiversity, ecosystem management, global climatic change, resource conservation, timber production, wildlife habitat, recreation, and sustainability of the biosphere. The balance between societal needs and utilization of forest resources is a continuing public debate. This publication serves a critical niche in capturing the state of knowledge on forest soils relative to several of the above national and international priorities. It targets organic matter and the role of carbon and nitrogen cycling as driving functions of forest ecosystems. Further, the publication forges a bridge and continued synergistic interaction among forest science professionals of North America.

The sponsors, editors, and authors are to be commended for their individual and collective efforts in bringing this publication to fruition. It provides a valuable treatise at a time when the public mandates increased sensitivity and attention to sustainability of the biosphere.

LARRY P. WILDING, *President*
Soil Science Society of America

PREFACE

Forest productivity and the factors which influence it have been the underlying theme uniting the seven previous North American Forest Soil Conferences which have occurred at 5-year intervals since the series was initiated in 1958. While that theme continues into this eighth conference, the focus has been directed to the single factor that in many ways describes, defines, and delineates the study of forest soils as a unique niche in the broader continuum of soil science.

In their preface to the proceedings of the third North American Forest Soils Conference C. T. Youngberg and C.B. Davey noted that “the growth of the tree and the productivity of the forest are directly affected by the quantity, quality and location of the soil.” Soil carbon in its myriad forms, perhaps as no other factor, influences soil–plant relationships through its direct and indirect impacts on mineral solubility, exchange capacity, nutrient availability, moisture supply, aggregate formation, and soil erosion. Hans Jenny, in his classic equation describing the factors of soil formation, placed organic matter in a pivotal role in the development of the soil and soil properties as well as the succession of associated plant communities.

Since the previous conference many changes in our approach to the management and preservation of the forest resource have occurred. Most significant of these developments has been the growing emphasis placed on understanding and manipulating forests as ecological units. Paralleling and to some extent driving this move toward an ecological focus has been the renewed realization of the important and dynamic nature of the interaction between the physical and biological resources. The role of forest soils, as well as the aboveground portion of the forest, as significant buffers against the impacts of anthropogenic activities on atmospheric carbon dioxide and the earth’s energy balance has driven home the necessity of continuing to develop and refine our knowledge of the interactions of soils, plants, and the environment in which they exist.

Three generations of forest soil scientists have now contributed to these volumes. During that time our knowledge has continued to expand and gain clearer focus. These gains have been the result of the collective work and interaction of the individual researcher and the peer community. Each of us has played a role in this procession and realizing that there is much yet to be done, it seems only appropriate that we collect our thoughts at these five year intervals and celebrate our accomplishments.

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