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SPECIAL ISSUE

TRANSPORT OF WATER AND SOLUTES IN MACROPORES

edited by
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Preface

This special issue of Geoderma consists of a collection of papers presented during a special Symposium on "Transport of Water and Solutes in Macropores" at the 80th Annual Meeting of the American Society of Agronomy in Anaheim, California (November 27–December 2, 1988). Main purpose of the Symposium was to review and discuss various experimental and theoretical approaches to quantifying the movement of water and dissolved constituents in macroporous soils.

The subject of solute transport in structured soils remains a significant and problematic area of research in soil science and hydrology. While the subject matter is certainly not new and has been studied for many decades, recent concern about the long-term quality of our soil and ground-water resources has motivated renewed studies of water and solute movement through soil macropores. For example, field and laboratory research now suggests that the standard equations predicting water flow and solute transport in homogeneous soils are largely inadequate for describing water and solute movement in structured (aggregated, macroporous, or fractured) field soils. Drying cracks in fine-textured soils, earthworm channels, gopher holes, decayed root channels, and interpedal voids in naturally aggregated soils and fractured rocks, provide an opportunity for water and dissolved chemicals or particulate matter to move preferentially from the soil surface through the vadose zone towards the groundwater table. The result is an increased potential for pollution of underlying ground-water systems by surface-applied or soil-incorporated fertilizers, pesticides and other chemicals intentionally or unintentionally released into the environment. Much laboratory and field evidence has been gathered over the last few years that demonstrates this preferential flow/transport process, alternatively termed also incomplete or partial mixing, macropore transport, fracture flow, preferred flow, short-circuiting, and non-Fickian transport.

The peer-reviewed papers in this special issue should give the reader an excellent comprehensive and multi-disciplinary view of the current state-of-the-art in research on solute transport in macroporous soils. We thank Geoderma for publishing this special issue and, hence, for facilitating a broad distribution of the symposium papers. We also acknowledge the Soil Science Society of America for permitting the papers to be published elsewhere. Finally, we hope that the material documented in this special issue will stimulate further discussions, as well indicate new opportunities of productive research on the problem of water and chemical transport in macroporous soils.

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