Soil is a unique biological system with an abundant microflora and a very high microbial diversity capable of performing multiple key ecosystem functions. The detection of genes in soil has improved the knowledge of unculturable microorganisms and led to a greater understanding of potential soil metabolic pathways. Further advances in understanding soil functionality are being realised by harnessing omics technologies such as metagenomics, metatranscriptomics, proteomics and volatilomics. The next challenge of systems biology and functional genomics is to integrate the information from omic approaches to give a more complete picture of soil as a biological system.

This volume presents the state-of-the-art of omic applications in soil science, a field that is advancing rapidly on many fronts. Distinguished authors describe the application of metagenomics, metatranscriptomics and proteomics to soil science. In particular the book covers the current and emerging omics techniques and the contribution of these approaches to a better assessment of soil functionality. The authors also explore the specific problems encountered in the application of various omics technologies to soil science and the future research requirements necessary to overcome the current limitations in this area. Topics covered include soil functional genomics, soil metagenomics, soil microbial ecology, soil metatranscriptomics, soil proteomics, soil volatilomics and soil proteogenomics. Omics techniques are also discussed in comparison with classical techniques.

This book is both a practical guide and a recommended reference volume for all soil scientists.

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