

Preface

In terrestrial ecosystems, soil is the rooting matrix in which plants grow. But, what makes for a good soil and what challenges are there for sustaining a soil for optimal plant growth? It is from this viewpoint that we have assembled the chapters in this book to describe the functional interactions of the organisms in soil that lead to soil quality. For most horticulturalists and agriculturalists, soil is a black box – the medium which supplies the plant with nutrients and water, to which fertilizers need to be added, on occasion, to maintain plant growth. However to the soil ecologist, soil is a living entity comprising of the mineral and organic matrix in which a myriad of life interacts with each other and with the plants growing there. This soil entity is a dynamic system with spatial and temporal heterogeneity making it one of the most complex of ecosystems. The complexity and biodiversity of organisms in soil is essential to the ecosystem services provided by soil and in maintaining homeostasis in the supply of nutrients for plant growth and suppression of plant pathogenic organisms. However, the disease suppressiveness of soil is challenged in the face of intensive agricultural practices, land use change, pollution and invasive species, which may suppress biodiversity and alter soil chemistry. Monocrop agriculture is more susceptible to pathogen attack than mixed crop or natural vegetation. Disturbance events reduce biodiversity and often leave a community less well adapted to protect plants from pathogens, and invasive species frequently change soil conditions to the dis-benefit of native vegetation, allowing competition by the invasive species to be enhanced.

This book originated from an interest in Dave Coleman's keynote address to the 6th Australian Soilborne Disease Symposium (Coleman 2011) in which he highlighted the importance of soil biodiversity in disease suppression as well as noting our lack of understanding of many components of soil that have received little investigation, including the role of viruses, trophic and non-trophic interactions regulating processes, soil management techniques and the increasingly important role that molecular tools may reveal in the functioning of microbial populations and communities. In this short book, we review and develop the idea that soil has both a suppressive and supportive role in plant growth. This is encompassed in soil biodiversity and the trophic and non-trophic interactions that occur within the soil biotic

community regulating the supply of nutrients to plant populations and communities. Much of the biotic interactions occur around the plant roots, so we explore the unique diversity of organisms in that zone, along with the plant pathogens that gain access via roots and investigate the effects of urbanization and invasive plants on these interactions as disturbance factors.

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Reference

Coleman DC (2011) Understanding soil processes: one of the last frontiers in biological and ecological research. *Aust Plant Pathol* 40:207–214

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