

Cambridge University Press

978-0-521-38236-6 - Biotechnology of Fungi for Improving Plant Growth

Edited by J. M. Whipps and R. D. Lumsden

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**Symposium of the British Mycological Society held at
the University of Sussex September 1988**



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Preface

The use of fungi for the improvement of plant growth is increasingly being implemented in agriculture, and several fungi have been commercialized for this purpose. For example, ectomycorrhizal fungi are used routinely for inoculation of forest trees, and endomycorrhizas are gaining acceptance in the horticultural industry. Fungi are commercially used to control weeds and they hold promise for the control of plant pathogenic nematodes and fungi, as well as insects. In addition, fungi may stimulate plant growth directly by production of metabolites or growth hormones.

The aim of this book is to describe these diverse uses of fungi to improve plant growth and examine the factors that enhance rapid commercialization. One of the greatest stimulations to research in this area has been the advances in technology associated with the selection, culture and formulation of fungi in relation to specific targets. The Chapters by Marx & Cordell, Harvey *et al.* and Gianinazzi, Gianinazzi-Pearson & Trouvelot explore the use of mutualistically symbiotic mycorrhizal fungi. Ectomycorrhizal fungi can now be grown successfully using large scale solid substrate systems and also liquid fermentation. The biomass obtained is used to inoculate millions of trees. For specific high value crops, problems associated with the inability to culture vesicular-arbuscular mycorrhizas have largely been overcome making inoculum production commercially feasible (Chapter by Gianinazzi *et al.*). Similarly, the control of weeds with fungi is proving to be commercially feasible (Chapter by Templeton & Heiny). Further research with these same basic concepts and approaches will improve the success rate for the control of insects (Chapter by Gillespie & Moorhouse), nematodes (Chapter by Kerry) and soilborne plant pathogens (Chapter by Lumsden & Lewis). Of particular relevance to potential advances are modern molecular approaches to fungal biotechnology such as protoplast fusion and genetic manipulation which provide the opportunity for recombination in a controlled manner of useful traits shown by different strains of fungi. These techniques and possible applications are examined in Chapters by Baker and Hocart & Peberdy. An understanding of the mechanisms of action of fungal biocontrol agents are a prerequisite to molecular studies. Examples of the mechanisms involved in the biocontrol of insects and diseases are described in Chapters by Charnley and Lewis *et al.*, respectively.

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Research on fungal biocontrol agents has also been stimulated by problems associated with the use of chemicals for control of weeds, pests and diseases. In addition to cases where no suitable chemical controls are known, concern exists over resistance of pathogens and pests to fungicides and pesticides, environmental damage by excessive chemical usage, and future restrictions on the use of chemicals. These concerns emphasise the need for biocontrol agents that give reproducible results at an economic cost, as explored in the Chapter by Powell & Faull. The selection and release of large numbers of fungi into the environment, particularly if they are genetically manipulated or mutant strains, introduces additional problems and these are considered in relation to disease biocontrol agents in the Chapter by Renwick & Poole.

The book is based on a series of papers presented at a meeting of the British Mycological Society at The University of Sussex, September 19-20, 1988 organized by the Biotechnology Special Interest Committee. We are grateful to all the authors for their contributions to the volume and for accepting suggestions from referees and editors to produce the final balance of the book. We would also like to thank members of the Society for initiating and planning the meeting. The Society wishes to record its thanks to ICI and Shell for donations in support of the meeting. Finally, we would like to thank David Moore for his excellent technical help and efficiency in producing the book from the manuscripts.

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