## 632.3 DIS

vi Contents

	4.5	Future prospects	82	
	4.6	Acknowledgements	83	
	4.7	References	83	
Chapter 5	The use of composts and compost extracts in plant disease control			
	Audrey Litterick and Martin Wood			
	5.1	Introduction	93	
	5.2	Definitions of composts, composting, compost extracts		
		and compost teas	93	
	5.3	Production of composts and compost extracts/teas	95	
	5.4	History of the use of composts and compost extracts in		
		crop production	96	
	5.5	Current use of composts and compost extracts/teas in		
		crop production	97	
	5.6	Crop and soil health	97	
	5.7	Effects of composts on plant disease	99	
	5.8	Effects of compost extracts/teas on plant disease	108	
	5.9	Mechanisms involved in the suppression/control of		
		plant disease using composts and compost extracts/teas	113	
		Conclusions and future work	116	
	5.11	References	[17	
Chapter 6	The use of host plant resistance in disease control			
	Hugh Wallwork			
	6.1	Introduction and benefits of resistance	122	
	6.2	Types of resistance	123	
	6.3	Sources of resistance	126	
	6.4	Breeding methodology and selection strategies		
		for inbreeding crops	132	
		Deployment of resistance	137	
		Conclusion	138	
	6.7	References	139	
Chapter 7	Crop tolerance of foliar pathogens: possible mechanisms			
		potential for exploitation	142	
	Ian Bingham and Adrian Newton			
	7.1	Introduction	142	
	7.2	Concepts and definitions – a historical perspective	142	
	7.3	Yield formation	144	
	7.4	How can tolerance be quantified?	146	
	7.5	Potential crop traits conferring tolerance	149	
	7.6	Is there a physiological or ecological cost to tolerance?	154	
	7.7	Role of modelling	155	
	7.8	Strategy for improving tolerance	156	
	7.9	Acknowledgements	157	
	7.10	References	157	

Chapter 8	Plant disease control through the use of variety mixtures			
	Adrian Newton			
	8.1 Introduction	162		
	8.2 Trial demonstrations of mixtures	163		
	8.3 Mixtures used in practice	165		
	8.4 Conclusion	167		
	8.5 References	168		
Chapter 9	Biofumigation for plant disease control – from the			
	fundamentals to the farming system			
	John Kirkegaard			
	9.1 Introduction	172		
	9.2 The glucosinolate-myrosinase system	173		
	9.3 Modes of utilization	174		
	9.4 Separating GSL-related suppression from other effects of			
	biofumigants	176		
	9.5 Maximizing biofumigation potential	179		
	9.6 Release efficiency, fate and activity of hydrolysis			
	products in soil	180		
	9.7 Ecological considerations	183		
	9.8 Field implementation	184		
	9.9 Summary	191		
	9.10 References	192		
Chapter 10	Control of plant disease through soil solarization			
	Abraham Gamliel and Jaacov Katan			
	10.1 Introduction	196		
	10.2 Principles of soil solarization	198		
	10.3 Pathogen and weed control	199		
	10.4 Mechanisms of control and plant-growth improvement	201		
	10.5 Integrated management	203		
	10.6 Modelling of soil solarization and decision-making tools	207		
	10.7 Improvements by intensifying soil heating	208		
	10.8 Implementation and application	211		
	10.9 Special uses of solarization	212		
	10.10 Solarization and the MB crisis	214		
	10.11 Concluding remarks	214		
	10.12 References	215		
Chapter 11	Plant disease control by nutrient management: sulphur			
	Silvia Haneklaus, Elke Bloem and Ewald Schnug			
	11.1 Introduction	221		
	11.2 Sulphur-induced resistance – agronomic, physiological and			
	molecular aspects	224		
	11.3 Perspectives in research	231		
	11.4 References	232		

Chapter 12	Control of plant disease by disguising the leaf surface		237	
	Dale Walters			
	12.1	Introduction	237	
	12.2	Controlling disease using film-forming polymers	237	
	12.3	Particle films as agents for control of plant diseases	242	
	12.4		242	
	12.5		243	
	12.6	e	244	
	12.7	References	244	
Chapter 13	Bacto	eriophages as agents for the control of plant		
	pathe	ogenic bacteria	246	
	Botor	nd Balogh, Timur Momol, Aleksa Obradovic and Jeffrey Jones		
	13.1	Introduction – disease control for bacterial diseases	246	
	13.2	Biological control	247	
	13.3	Early use of bacteriophages in agriculture	247	
	13.4	Recent approaches for using phages in plant pathology	248	
	13.5	Challenges in using phages for disease control	252	
	13.6	Phages as part of an integrated management strategy	253	
	13.7	Summary	254	
	13.8	References	254	
Chapter 14	Controlling plant disease using biological and environmentally			
-	friendly approaches: making it work in practice		257	
	Dale Walters			
	14.1	Introduction	257	
	14.2	How might biologically based disease control be		
		used in crop protection practice?	258	
	14.3	Biologically based disease control: barriers to		
		implementation	259	
	14.4	Conclusions	260	
	14.5	Acknowledgements	260	
	14.6	References	260	

Index

263

## Contents

List of contributors			
Preface		xiii	
Chapter 1	Introduction		
	Dale Walters		
	1.1 The importance of plant disease	1	
	1.2 Problems associated with controlling plant disease	3	
	1.3 Conclusions	5	
	1.4 Acknowledgements	5	
	1.5 References	5	
Chapter 2	Managing crop disease through cultural practices	7	
	Dale Walters		
	2.1 Introduction	7	
	2.2 Reducing the amount of pathogen inoculum	7	
	2.3 Reducing pathogen spread within the crop	9	
	2.4 Soil amendments and mulching	12	
	2.5 Suppressive soils	18	
	2.6 Intercropping	19	
	2.7 Conclusions	20	
	2.8 Acknowledgements	21	
	2.9 References	21	
Chapter 3	Biological control agents in plant disease control	27	
	John M. Whipps and Mark P. McQuilken		
	3.1 Introduction	27	
	3.2 Modes of action	28	
	3.3 Production, formulation and application	34	
	3.4 Commercial products available and uses	42	
	3.5 Factors affecting variable efficacy and constraints on		
	commercial developments	46	
	3.6 Future research directions and conclusions	49	
	3.7 References	50	
Chapter 4	Induced resistance for plant disease control	62	
	Tony Reglinski and Dale Walters		
	4.1 Introduction	62	
	4.2 Induced resistance in practice	64	
	4.3 Costs associated with induced resistance	78	
	4.4 Trade-offs associated with induced resistance	80	