

Contents

Prefaceix

- Why Study Plant Pathology? ix
- How to Use This Textbook and DVD x
- Acknowledgments xiii

CHAPTER 1

What Is Wrong with My Plant? 1

- How do we diagnose plant diseases? 2
- What is the plant disease triangle? 4
- How do we know what organism causes a disease? 8
- What are biotrophs and necrotrophs? 10
- What are disease cycles and how can we use them? 12

CHAPTER 2

What Are the Causes of Plant Diseases?

- Fungi 21
 - What are fungi? 21
 - What symptoms and signs do fungi cause? 24
 - How do fungi survive and spread? 34
 - How are fungal diseases diagnosed? 35
 - How are fungal diseases managed? 37
 - More detailed information about fungi, their reproduction, and fruiting bodies 39

CHAPTER 3

What Are the Causes of Plant Diseases?

- Bacteria 51
 - What are bacteria? 51
 - What symptoms and signs do bacteria cause? 54
 - How do bacteria survive and spread? 57
 - How are bacterial diseases diagnosed? 59
 - How are bacterial diseases managed? 61

CHAPTER 4

What Are the Causes of Plant Diseases?

- **Nematodes** 69
 - What are nematodes? 69
 - What symptoms and signs do nematodes cause? 71
 - How do nematodes survive and spread? 75
 - How are nematode diseases diagnosed? 77
 - How are nematode diseases managed? 79

CHAPTER 5

What Are the Causes of Plant Diseases?

- **Viruses** 87
 - What are viruses? 87
 - What symptoms and signs do viruses cause? 91
 - How do viruses survive and spread? 93
 - How are virus diseases diagnosed? 96
 - How are virus diseases managed? 100

CHAPTER 6

What Are the Causes of Plant Diseases?

- **Parasitic Flowering Plants** 109
 - What are parasitic flowering plants? 109
 - What symptoms and signs do parasitic flowering plants cause? 110
 - How do parasitic flowering plants survive and spread? 113
 - How are diseases caused by parasitic flowering plants diagnosed? 114
 - How are parasitic flowering plants managed? 115

CHAPTER 7

What Are the Causes of Plant Diseases?

- **Abiotic Factors** 121
 - What are abiotic factors? 121
 - What symptoms do abiotic factors cause? 128
 - How are abiotic diseases diagnosed? 133
 - How are abiotic diseases managed? 135

CHAPTER 8

What Types of Plant Diseases Are There? 143

- What is damping-off? 144
- What diseases commonly affect foliage, flowers, and fruit? 145

What are vascular diseases? 156
 What are cankers? 161
 What are galls? 163
 What are root rots? 166
 What is wood decay? 169
 What are postharvest diseases? 170

CHAPTER 9

How Do Plants Interact with Pathogens? 179

Part A. Ecological interactions 181
 How do pathogens survive in the absence
 of host plants? 181
 How do pathogens find plants? 189
 How do pathogens penetrate plants? 194
Part B. Physiological interactions 197
 How do pathogens establish infections? 197
 How do plants defend themselves? 204
Part C. Genetic interactions 211
 What are the genetic interactions between plants
 and pathogens? 211
 How can we create disease-resistant plants? 215

CHAPTER 10

How Do People Influence

Plant Disease Epidemics? 229

What is an epidemic? 229
 Can we predict plant diseases? 235
 How do people affect the susceptibility of plants
 to disease? 238
 How do people affect the environment of plants in ways that
 increase disease? 242
 How do people affect the ability of pathogens to cause
 disease? 245
 How do plant disease epidemics affect people? 250

CHAPTER 11

How Can We Prevent or Manage

Plant Disease Epidemics? 257

How do we choose the appropriate methods
 for disease management? 257
 How do we **avoid** pathogens? 258
 How do we **exclude** pathogens? 259
 How do we **eradicate** pathogens? 263

How do we **protect** plants? 274
How can we create integrated, sustainable
management programs? 290

APPENDIX 1

Disease Classics 301

APPENDIX 2

Example Diseases 303

APPENDIX 3

Rapid Assays for Pathogens 311

Immunoassays 311
DNA-based tests, including PCR 313
Which to use: Immunoassay, PCR, or standard
microscopic examination and culturing? 314

Figure Credits 317

Glossary 325

Index 353