



THEORY

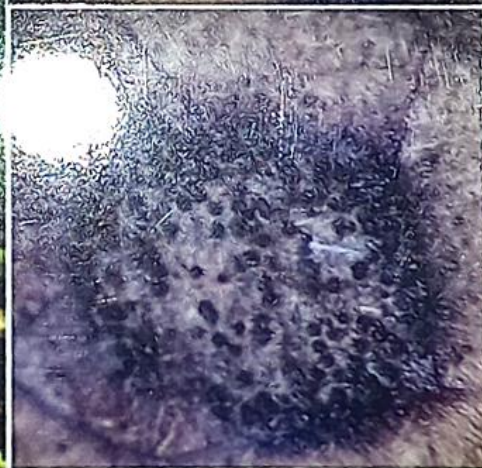


PRACTICE



TECHNIQUES

Theory, Practice and Techniques in Plant Pathology



3G E-LEARNING

Theory, Practice and Techniques in Plant Pathology

THEORY, PRACTICE AND TECHNIQUES IN PLANT PATHOLOGY



3G E-LEARNING

© 2018 3G E-learning LLC
90 Church Street
FL 1 #3514
New York, NY 10008
United States of America
www.3ge-learning.com
email: info@3ge-learning.com

Authored and Edited by 3G E-learning LLC, USA

ISBN: 978-1-68094-751-9

00077667

This book contains information obtained from highly regarded resources. A Wide variety of references are listed. Reasonable efforts have been made to publish reliable data and information, but the authors, editors, and the publisher cannot assume responsibility for the legality of all materials or the consequences of their use. The authors, editors, and the publisher have attempted to trace the copyright holders of all material in this publication and express regret to copyright holders if permission to publish has not been obtained. If any copyright material has not been acknowledged, let us know so we may rectify in any future reprint. Registered trademark of products or corporate names are used only for explanation and identification without intent to infringe.

Notice: Registered trademark of products or corporate names are used only for explanation and identification without intent of infringement. Case Studies and/or Images presented in the book are the proprietary information of the respective organizations, and have been used here specifically and only for educational purposes. Although care has been taken to check accuracy of formulas and procedures, the detailed methods should be tested further on a small scale before being adopted commercially.

For more information visit about 3G E-Learning LLC and its products, visit www.3ge-learning.com

TABLE OF CONTENTS

Preface.....	ix
Chapter 1 Introduction to Plant Pathology	1
1.1 Concepts of Plant Pathology	1
Definition.....	2
Scope of Plant Pathology	3
Importance of Plant Pathology.....	3
Molecular Plant Pathology.....	5
Role of Plant Pathologist.....	6
Relationship of Plant Pathology with Other Sciences.....	8
Objectives of Plant Pathology.....	8
3.2 History of Plant Pathology	10
Definition.....	11
Ancient Era: Ancient to 5th Century (476 A.D)	12
Dark Era (476 A.D to 1600).....	12
Premodern Era 18th century to 1853 (1600 to 1853).....	13
Modern Era 1853 to 1906	14
Present Era 1906 Onwards	15
Summary	17
Knowledge Check.....	18
Review Questions.....	19
References.....	21
Chapter 2 Plant Disease.....	25
2.1 Overview of Plant Disease	25
Definition.....	26
Nature and Importance of Plant Diseases.....	27
Definitions of Plant Disease	29
Factors Affecting Disease Development.....	29
2.2 Diagnosis of Plant Diseases.....	44
Definition.....	45
Variable Factors Affecting Diagnosis.....	45
Technological Advances in the Identification of Pathogenic Agents.....	56
2.3 Principles of Disease Control	58
Definition.....	59
Exclusion and Avoidance	59
Eradication.....	59
Protection	60
Therapy.....	64

Host Resistance and Selection	64
Summary	69
Knowledge Check.....	70
Review Questions.....	72
References	73
Chapter 3 Causes of Plant Disease.....	77
3.1 Cause of Disease in Plants.....	77
Definition.....	78
Abiotic Causes	78
Mesobiotic Causes	89
Biotic Causes	90
Disease Cycles	92
Plant Diseases Control	93
3.2 Classification of Plant Diseases by Causal Agent	96
Definition.....	97
Noninfectious Disease-Causing Agents.....	97
Infectious Disease-Causing Agents	101
Diseases Caused by Viruses and Viroids.....	102
Diseases Caused by Bacteria	106
Diseases Caused by Fungi	111
Diseases Caused by Nematodes	126
Summary	135
Knowledge Check.....	136
Review Questions.....	138
References	139
Chapter 4 Plant Disease Epidemiology.....	143
4.1 Plant Disease Epidemiology Concepts in Epidemiology.....	143
Definition.....	144
Historical Developments of Epidemiology.....	144
Disease Progress	145
The Cyclical Nature of Plant Disease.....	149
Relating Disease Progress to Disease Cycles.....	151
Monocyclic Epidemics	152
Polycyclic Epidemics.....	154
Combinations of Monocyclic and Polycyclic Epidemics.....	155
4.2 Disease Triangle	157
Definition.....	158
Host Factors	160
Pathogenic Factors.....	161
Environmental Factors	164
Summary	168

Knowledge Check.....	169
Review Questions.....	171
References.....	172
Chapter 5 Mycology	177
5.1 Concepts of Mycology	177
Definition.....	178
Kingdom Fungi.....	179
Beneficial and Harmful Fungi.....	181
Types of Fungi.....	182
Characteristics of Fungi.....	193
Importance of Fungi.....	193
Form and Function of Fungi.....	198
5.2 Reproductive Processes of Fungi	214
Definition.....	215
Asexual Reproduction.....	215
Sexual Reproduction.....	216
Life Cycle of Fungi.....	218
Ecology of Fungi.....	219
Lichens.....	220
Evolution and Phylogeny of Fungi.....	229
Outline of Classification of Fungi.....	232
Summary.....	238
Knowledge Check.....	238
Review Questions.....	240
References.....	242
Chapter 6 Applications of Biotechnology in Plant Pathology.....	247
6.1 Overview of Plant Biotechnology.....	247
Definition.....	248
Definition of Plant Biotechnology.....	249
Characteristics of Biotechnology.....	249
DNA and Genetic Engineering the Beginning of Modern Biotechnology.....	252
Plant Tissue Culture.....	253
Condensed Cronology of Important Development in the Plant Tissue Culture.....	256
Plant Regeneration.....	269
6.2 Recombinant DNA Technology.....	273
Definition.....	274
DNA Structure.....	274
Restriction Enzymes.....	275
DNA Cloning.....	276

Nucleic Acid Hybridization.....	277
Polymerase Chain Reactions	277
Gene Transfer in Plants.....	278
Transgenic Plants	279
Protoplasmic Fusion.....	284
Spontaneous Fusion	285
Mechanical Fusion.....	286
Induced Fusion	286
Electro Fusion	287
Single Cell Protein.....	288
Summary	293
Knowledge Check.....	294
Review Questions.....	295
References	296
INDEX	301

Level: Beginner to Advanced
Subject: Agriculture and Life Sciences

Theory, Practice and Techniques in Plant Pathology

Plant pathology is concerned with keeping plants healthy by diagnosing and treating common plant diseases. Plant diseases play an important role on our daily lives. Most of plant diseases are visible and are caused by biotic and/or abiotic factors. Symptoms are usually the results of a morphological change, alteration or damage to plant tissue and/or cells due to an interference of the plant's metabolism. All basic structures of vascular plants are subject to attack by pathogens. The failure in accurate disease diagnosis and management may lead to huge losses in plant production and related commodities, which causes nutritional food scarcity. Typically, the appearance of a biotic symptom will indicate the relatively late stage of an infection and/or colonization of a pathogen. Significant diseases of plants in agriculture are caused by diverse pathogens, including viruses, bacteria, fungi, and nematodes. Plant diseases are of paramount importance to humans because they damage plants and plant products on which humans depend for food, clothing, furniture, the environment, and in many cases housing. For millions of people all over the world who still depend on their own plant produce for survival, plant diseases can make the difference between a happy life and a life haunted by hunger or even death from starvation. For countries where food is plentiful, plant diseases are significant primarily because they cause economic losses to growers.

"Theory, Practice and Techniques in Plant Pathology" covers several aspects of plant pathology and its sub disciplines like Mycology, Plant Virology, Plant Bacteriology and Plant Nematology etc. Diagnosis, disease management, and the molecular basis of host-pathogen interactions are examined. The each chapter contains specific key notes, learning objectives, comprehensive indicative content, tables, and illustrations together with the topic areas. This book has been designed essentially for the use of students engaged in advanced undergraduate and postgraduate courses in plant pathology.



3G E-LEARNING

www.3ge-learning.com
email: info@3ge-learning.com

ISBN 978-1-68094-751-9

