

Plant Virology

This volume discusses traditional and current techniques that are successfully used to diagnose plant viruses and study molecular plant-virus interactions. The chapters in this book cover topics such as in vivo detection of double-stranded RNA, developing rice mutant using CRISPR-Cas9-based technology, protein-protein interaction assays, purification and transfection of protoplasts, protocols for gene silencing, and transmission electron microscopy. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Cutting-edge and practical, *Plant Virology: Methods and Protocols* is a valuable resource for plant pathologists, microbiologists, virologists, graduate students, and teachers who are interested in learning more about the developments in plant virology research.

Viruses that infect plants are responsible for reduction in both yield and quality of crops around the world, and thus are of great economic importance. This has provided the impetus for the extensive research into the molecular and cellular biology of these pathogens and into their interaction with their plant hosts and their vectors. However, interest in plant viruses extends beyond their ability to damage crops. Many plant viruses - for example, tobacco mosaic virus - have been used as model systems to provide basic understanding of how viruses express genes and replicate. Others permitted the elucidation of the processes underlying RNA silencing, now recognized as a core epigenetic mechanism underpinning numerous areas of biology. This book attests to the huge diversity of research in plant molecular virology. Written by world authorities in the field, the book opens with two chapters on the translation and replication of viral RNA. Following chapters cover topics such as viral movement within and between plants, plant responses to viral infection, antiviral control measures, virus evolution, and newly emerging plant viruses. The book concludes with two chapters on biotechnological applications of plant viruses. Throughout, the focus is on the most recent, cutting-edge research, making this book essential reading for everyone working with plant viruses.

The book is a compilation of research work carried out on plant viruses during past 100 years in India. Plant viruses are important constraints in Indian agriculture. Tropical and sub-tropical environments and intensive crop cultivation practices ideally favours perpetuation of numerous plant viruses and their vectors in India, which often cause wide spread crop losses. Of all the plant pathogens, studies of plant viruses have received a special attention as they are difficult to manage. A large body of literature has been published on the plant virus research from India during past 100 years; however the information is so far not available in one place. This book provides comprehensive information on the biology, molecular biology, epidemics, crop losses, diagnosis and management

of viruses and viroids occurring in India. Description of properties of the viruses are provided in the chapters comprising of different genera such as Allexivirus, Begomovirus, Babuvirus, Badnavirus, Carlavirus, Carmovirus, Cucumovirus, Closterovirus, Ilavirus, Mandrivirus, Potyvirus, Tospovirus, Tungrovirus and Sobemovirus. Virus-vector research related to aphid, thrips and whitefly is discussed. The work on the management aspects of plant viral diseases has been described with reference to the conventional, antiviral and transgenic approaches. Further, the quarantine mechanism developed in India for the exclusion of viruses and vectors has also been included. The book also provides useful information about the capacity building on the research and education on Plant Virology in India. Overall, the book covers a wide range of accounts of research findings and innovations in Plant Virology in India during past 100 years. The book will be a resourceful reference to the students, scientists, agricultural professionals and policy makers.

From virus discovery to virology; Viruses as disease incitants; Viruses as contagious agents; Viruses as physico-chemical particles; Serology and electron microscopy; Viruses as packages of genetic information; Order out of chaos; Ecology of viruses; Human interference with viruses.

It has been ten years since the publication of the third edition of this seminal text on plant virology, during which there has been an explosion of conceptual and factual advances. The fourth edition updates and revises many details of the previous editon, while retaining the important older results that constitute the field's conceptual foundation. Key features of the fourth edition include: *

Thumbnail sketches of each genera and family groups * Genome maps of all genera for which they are known * Genetic engineered resistance strategies for virus disease control * Latest understanding of virus interactions with plants, including gene silencing * Interactions between viruses and insect, fungal, and nematode vectors * New plate section containing over 50 full-color illustrations

Plant genetic engineering has revolutionized our ability to produce genetically improved plant varieties. A large portion of our major crops have undergone genetic improvement through the use of recombinant DNA techniques in which microorganisms play a vital role. The cross-kingdom transfer of genes to incorporate novel phenotypes into plants has utilized microbes at every step-from cloning and characterization of a gene to the production of a genetically engineered plant. This book covers the important aspects of Microbial Biotechnology in Agriculture and Aquaculture with and aim to improve crop yield. Fundamentals of Plant Virology is an early on understudy content covering all of present day plant virology. A chronicled and future diagram finishes up the content. Fundamentals of Plant Virology is a deliberately outlined instructional arrangement for a plant virology course. It is likewise a priceless asset for understudies of plant pathology and plant sub-atomic science. Summarizes information on all parts of plant virology; Condenses all fundamental material from Plant Virology; Compares essential properties of cells and infections;

Outlines standards of quality control innovation; Discusses serological strategies including monoclonal antibodies. This book is proposed to give data in plant pathology, plant virology, general virology, and microbiology, and for educators and research specialists in these fields. It ought to likewise demonstrate helpful to a few people in related controls-sub-atomic scholars, natural chemists, plant physiologists, and entomologists.

Plant Virus-Host Interaction: Molecular Approaches and Viral Evolution, Second Edition, provides comprehensive coverage of molecular approaches for virus-host interaction. The book contains cutting-edge research in plant molecular virology, including pathogenic viroids and transport by insect vectors, interference with transmission to control viruses, synergism with pivotal coverage of RNA silencing, and the counter-defensive strategies used by viruses to overcome the silencing response in plants. This new edition introduces new, emerging proteins involved in host-virus interactions and provides in-depth coverage of plant virus genes' interactions with host, localization and expression. With contributions from leading experts, this is a comprehensive reference for plant virologists, molecular biologists and others interested in characterization of plant viruses and disease management. Introduces new, emerging proteins involved during the host-virus interaction and new virus strains that invade new crops through recombination, resorting and mutation Provides molecular approaches for virus-host interaction Highlights RNA silencing and counter-defensive strategies for disease management Discusses the socioeconomic implications of viral spread and mitigation techniques

Comparative Virology provides an integrated comparison of viruses, based on their chemical and morphological characteristics. These descriptions will not only give the reader a background but also a detailed analysis of the various groups. In some instances the groups are still host related, as in the case of bacteriophages and polyhedral insect viruses. In others, for instance in pox viruses, the group comprises viruses of vertebrates and invertebrates. The hosts of the bacilliform Rhabdovirales range from man and other warm-blooded vertebrates through invertebrate animals to plants. A special chapter is devoted to viruses devoid of protein—a group that is of great interest and that has only recently been recognized. Since there is historical and practical interest in *écologie* groupings, such as arboviruses and oncogenic viruses, chapters on such groups have also been included. The book opens with a discussion on the classification of viruses. Chapters dealing with DNA viruses and RNA viruses follow, and the ecologically and disease-oriented groups complete the volume. It is hoped that "*Comparative Virology*" will help bring unity to the science of virology through the comparative approach that is not dependent on virus-host interactions. The combined efforts of eminent contributors to discuss and evaluate new information will hopefully benefit all who are interested in virology

Major developments have taken shape in the ten years since the publication of *Plant Virology, Second Edition*. This Third Edition of the leading comprehensive text and reference for the field contains more than sixty percent new material, including applications and results of gene manipulation techniques. As with the first and second editions, this volume covers all aspects of plant virology, from molecular to ecological. *Plant Virology, Third Edition*, is intended for graduate students, researchers, and teachers in plant virology, plant pathology, general virology, and microbiology, and scientists in related areas of molecular biology, biochemistry, plant physiology, and entomology.

Fundamentals of Plant Virology is an introductory student text covering all of modern plant virology. The author, Dr. R.E.F. Matthews, has written this coursebook based on his classic and comprehensive *Plant Virology, Third Edition*. Four introductory chapters review properties of viruses and cells and techniques used in their study. Five chapters are devoted to current

knowledge of all major plant viruses and related pathogens. Seven chapters describe biological properties such as transmission, host response, disease, ecology, control, classification, and evolution of plant viruses. A historical and future overview concludes the text. Fundamentals of Plant Virology is a carefully designed instructional format for a plant virology course. It is also an invaluable resource for students of plant pathology and plant molecular biology. Summarizes knowledge on all aspects of plant virology Condenses all essential material from Plant Virology 3/e Compares basic properties of cells and viruses Outlines principles of gene manipulation technology Discusses serological techniques including monoclonal antibodies Geared to student level course

Applied Plant Virology: Advances, Detection, and Antiviral Strategies provides an overview on recent developments and applications in the field of plant virology. The book begins with an introduction to important advances in plant virology, but then covers topics including techniques for assay detection and the diagnosis of plant viruses, the purification, isolation and characterization of plant viruses, the architecture of plant viruses, the replication of plant viruses, the physiology of virus-infected hosts, vectors of plant viruses, and the nomenclature and classification of plants. The book also discusses defense strategies by utilizing antiviral agents and management strategies of virus and viroid diseases. With contributions from an international collection of experts, this book presents a practical resource for plant virologists, plant pathologists, horticulturalists, agronomists, biotechnologists, academics and researchers interested in up-to-date technologies and information that advance the field of plant virology. Covers the detection, control and management of plant viruses Discusses antiviral strategies, along with mechanisms of systemic induced resistance to enhance the defense of plants against viruses Provides contributory chapters from expert plant virologists from different parts of the world

This text elucidates the latest techniques in plant virology for the isolation of plant viruses, for RNA extraction, and for the localization and cloning of coat protein genes, among others. Plant viruses are significant as they affect our food supply and are capable of rapidly spreading to new plant species, so a comprehensive study of plant viruses is important in understanding their pathogenesis and prevention. This book focuses on the plant virus evolution, their molecular classification, epidemics and management. The key features in the book includes genome organization, translation and replication, virus-coded proteinases, structure of virus particles, cell receptors and host range, the RNA polymerase, quasispecies dynamics and virus evolution, and its natural habitats.

Plant Virology, Second Edition, was written to cover the substantial developments in many areas of plant virology since the first edition was published. Advances have been made in all branches of the subject, but these have been most far reaching with respect to the structure of viruses and of their components, and in the understanding of how viral genomes are organized and how viruses replicate in cells. Significant developments have also occurred in the understanding of how viruses are transmitted by invertebrates and in the application of control measures for specific diseases. The taxonomy of viruses has advanced significantly, and there are now 25 internationally approved families and groups of plant viruses. All these developments have required that most sections be entirely rewritten. This book is intended primarily for graduate students in plant pathology, plant virology, general virology, and microbiology, and for teachers and research workers in these fields. It should also prove useful to some people in related disciplines—molecular biologists, biochemists, plant physiologists, and entomologists.

Serology and Immunochemistry of Plant Viruses investigates the antigenic properties of plant viruses. It looks at the practical aspects of plant virus serology, along with the

molecular basis of viral antigenicity, antigenic determinants in proteins, the structure of antibodies, virus purification, antiserum production, and the theoretical principles and practical implementation of the various serological techniques. It also considers the problems associated with identification and classification of plant viruses. Organized into 10 chapters, this volume begins with an overview of antigens and antigenic determinants before proceeding with a discussion of the immunochemistry of plant viruses, virus-antibody binding, the role of quaternary structure in antigenicity, and the structure of viral antigenic determinants. The reader is also introduced to the methods and principles of purifying plant viruses, preparation of antisera and purification of antibodies, antigen-antibody interaction, immunochemical techniques used with plant viruses, the role of quaternary structure on viral antigenicity, diagnosis of virus diseases, use of serological criteria for measuring the degree of relationship between viruses, and immunochemical studies of plant viruses. The book includes a bibliography with 1,400 references and a list of all the plant viruses that have been studied by serology. This book will be a useful resource for virologists and plant pathologists, as well as for students and research workers in plant virology, plant pathology, microbiology, and general virology.

Topics covered in this book include RNA silencing and its suppression in plant virus infection, virus replication mechanisms, the association of cellular membranes with virus replication and movement, plant genetic resistance to viruses, viral cell-to-cell spread, long distance movement in plants, virus induced ER stress, virus diversity and evolution, virus-vector interactions, cross protection, geminiviruses, negative strand RNA viruses, viroids, and the diagnosis of plant viral diseases using next generation sequencing. This book was anticipated to help plant pathologists, scholars, professors, teachers and advanced students in the field with a comprehensive state-of-the-art knowledge of the subject.

This volume consists of 85 chapters that highlight recent advances in our knowledge of the viruses that infect plants and fungi. It begins with general topics in plant virology including movement of viruses in plants, the transmission of plant viruses by vectors, and the development of virus-resistant transgenic plants. The second section presents an overview of the properties of a selection of 20 well-studied plant viruses, 23 plant virus genera and a few larger groups of plant viruses. The third section, which is abundantly illustrated, highlights the most economically important virus diseases of cereals, legumes, vegetable crops, fruit trees and ornamentals. The last section describes the major groups of viruses that infect fungi. The most comprehensive single-volume source providing an overview of virology issues related to plant and fungi Bridges the gap between basic undergraduate texts and specialized reviews Concise and general overviews of important topics within the field will help in preparation of lectures, writing reports, or drafting grant applications

This new edition covers the many new techniques that are now applied to the examination and understanding of plant viruses. Each section of *Plant Virology Protocols* presents the most novel methods and protocols to allow researchers more effective approaches to study plant viruses. The many subjects covered in this new edition range from techniques for investigating viral nucleic acid sequence, protein analysis and investigation of protein function, techniques for microscopy/GFP visualization and analysis/protein tagging/generation of infectious clones and other

such tools, as well as areas of genomics and interactions with host factors and plant-based studies.

"Experimental Plant Virology" provides the updated methodology for studying the genomic characterization and mechanisms of infection, the quantitative determination as well as the diagnosis of plant pathogenic viruses. With illustrations showing viral symptoms and ultra-structures, clear and concise descriptions, the book presents the latest developments in experimental plant virology. This book is intended for researchers, university teaching staff, graduate students and undergraduates in plant science. Dr. Jishuang Chen is a professor of plant pathology at the Institute of Bioengineering, Zhejiang Sci-Tech University, China.

For the past twenty years I have worked as an applied plant virologist, attempting to identify and control virus diseases in field crops. During the last ten years it has been my privilege to present short courses in plant virology to final-year students studying plant pathology, micro biology and general botany. Throughout the period I have been lecturing, it has been possible to recommend several excellent 'library' books for further reading in plant virology, but there has been no publication covering applied plant virology that a student might consider purchasing. With teaching requirements in mind this book has been written to provide a concise introduction to applied plant virology based on the experiences I have gained working on virus diseases, both in an applied laboratory and in the field. The text concentrates on introducing the reader to aspects of plant virology that would be encountered every day by an applied virologist trying to identify viruses and develop control measures for virus diseases of crop plants.

Although a brief introduction to virus structure and its terminology is given in the opening chapter of the book, no attempt is made to cover in detail the more fundamental aspects of virus structure, biochemistry and replication. Similarly, the symptoms caused by individual viruses are not described, although the various types of symptoms that plant viruses cause and which might be encountered by a student or research worker are described.

In calling this series Molecular Plant Virology, I had in mind aspects of plant virology of interest to biochemists, molecular geneticists, biophysicists, genetic engineers, or, collectively, molecular biologists. At the same time, the intention was to provide up-to-date reviews, by expert contributors, on current research topics in plant virology of interest and referential use to virologists and plant biologists. The selected topics are pitched mainly at a research level, but with sufficient introduction and cross-referencing to enable graduate students to enter this fascinating field and, hopefully, not get lost. Written for advanced undergraduate students, this book is a practical, in-depth guide to plant virology. Beginning with an introduction to viruses and their classification, the text describes virus pathology, including how viruses enter and move through plant cells and induce disease. Subsequent chapters discuss how viruses spread in the field and how to measure this. Throughout, the book remains reader-friendly, using focus boxes for clear, easy to obtain information, enabling students to quickly access relevant information but supply sufficient detail for advanced studies. In addition to basic information on virus biology there is an additional focus on applied virology, ideal for students undertaking agricultural studies for whom study of disease and its control is essential.

Plant Virology Protocols: New Approaches to Detect Viruses and Host Responses

addresses recent developments in genome analyses and cytological technologies being used today to learn more about plant virology. Opening with chapters covering techniques relevant to the detection of unknown viruses and disease diagnosis, this detailed volume continues with chapters on the utilization of meta-genome sequencing and global gene expression analyses for the search and identification of viruses, as well as the elucidation of host responses to viral infection, construction methods of infectious cDNAs, and methods relevant to plant virus control. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, *Plant Virology Protocols: New Approaches to Detect Viruses and Host Responses* will be an invaluable guide to researchers working in the field of plant sciences.

The seminal text *Plant Virology* is now in its fifth edition. It has been 10 years since the publication of the fourth edition, during which there has been an explosion of conceptual and factual advances. The fifth edition of *Plant Virology* updates and revises many details of the previous edition while retaining the important earlier results that constitute the field's conceptual foundation. Revamped art, along with fully updated references and increased focus on molecular biology, transgenic resistance, aphid transmission, and new, cutting-edge topics, bring the volume up to date and maintain its value as an essential reference for researchers and students in the field. Thumbnail sketches of each genera and family groups Genome maps of all genera for which they are known Genetic engineered resistance strategies for virus disease control Latest understanding of virus interactions with plants, including gene silencing Interactions between viruses and insect, fungal, and nematode vectors Contains over 300 full-color illustrations

Plant Virology Academic Press

Encyclopedia of Virology, Fourth Edition, builds on the solid foundation laid by the previous editions, expanding its reach with new and timely topics. In five volumes, the work provides comprehensive coverage of the whole virosphere, making this a unique resource. Content explores viruses present in the environment and the pathogenic viruses of humans, animals, plants and microorganisms. Key areas and concepts concerning virus classification, structure, epidemiology, pathogenesis, diagnosis, treatment and prevention are discussed, guiding the reader through chapters that are presented at an accessible level, and include further readings for those needing more specific information. More than ever now, with the Covid19 pandemic, we are seeing the huge impact viruses have on our life and society. This encyclopedia is a must-have resource for scientists and practitioners, and a great source of information for the wider public. Offers students and researchers a one-stop shop for information on virology not easily available elsewhere Fills a critical gap of information in a field that has seen significant progress in recent years Authored and edited by recognized experts in the field, with a range of different expertise, thus ensuring a high-quality standard Viruses require a special approach to establish their presence in a diseased plant since they are not visible, even under a light microscope. This manual describes in detail a variety of protocols for determining the properties and identity of a virus and its behavior in infected plants. A Springer Lab Manual.

Comparative Plant Virology provides a complete overview of our current knowledge of plant viruses, including background information on plant viruses and up-to-date aspects of virus biology and control. It deals mainly with concepts rather than detail. The focus will be on plant viruses but due to the changing environment of how virology is taught, comparisons will be drawn with viruses of other kingdoms, animals, fungi and bacteria. It has been written for students of plant virology, plant pathology, virology and microbiology who have no previous knowledge of plant viruses or of virology in general. Boxes highlight important information such as virus definition and taxonomy Includes profiles of 32 plant viruses that feature extensively in the text Full color throughout

All the information you need on plant viruses in a single volume The Handbook of Plant Virology is a comprehensive guide to the terms and expressions commonly used in the study of plant virology, complete with descriptions of plant virus families down to the generic level. Rather than simply listing terms in alphabetical order, this unique book links each term to related terms within a theme and adds commentary from authors whose specific expertise adds additional dimensions to the topics. The result is an invaluable resource for research workers, educators, and students working in plant virology and pathology, crop protection, molecular biology, and plant breeding. The Handbook of Plant Virology provides enough details and background in the discussion of each topic to present a clear and thorough understanding of terms without the lengthy analysis found in most textbooks. The book's first section covers: the mechanics of virus classification internal and external symptoms (with color illustrations) isolation and purification genome packaging replication and gene expression detection and identification various methods of virus transmission serology forecasting disease development recombination control strategies economic importance and much more The second section of The Handbook of Plant Virology is devoted to concise descriptions of the 81 genera and 18 families of plant viruses, including: positive-sense, single-stranded RNA viruses, such as Potyviridae, Sequiviridae, and Comoviridae double-stranded RNA viruses, such as Reoviridae and Partitiviridae negative-sense, single-stranded RNA viruses, such as Rhabdoviridae and Bunyaviridae single-stranded DNA viruses, such as Geminiviridae, Pseudoviridae, Metaviridae The Handbook of Plant Virology also includes photos, illustrations, figures, diagrams, and brief, but detailed, bibliographies. The book's concise mix of information on currently assigned taxonomic families and the genera of plant viruses make it an essential reference tool for practitioners, researchers, educators, and students.

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