

Disease Resistance In Plants 2nd Edition By Vanderplank J E

Disease and Insect Resistance in Plants Disease Resistance in Plants Diseases Resistance in Plants Disease resistance on plants Disease Resistance in Plants Mechanisms of Resistance to Plant Diseases Plant Resistance to Herbivores and Pathogens Multigenic and Induced Systemic Resistance in Plants Induced Resistance for Plant Defence Breeding for Disease Resistance Fungal Disease Resistance in Plants Durability of Disease Resistance Disease Resistance in Crop Plants Bacterial Disease Resistance in Plants Durable Resistance in Crops Induced Resistance for Plant Defense Library of Congress Subject Headings Library of Congress Subject Headings Induced Resistance to Disease in Plants Breeding Plants for Disease Resistance Dhan Pal Singh J.E. Vanderplank J. E. Van der Plank J. E. Van der Plank James Edward Vanderplank A.J. Slusarenko Robert S. Fritz Tuzun Sadik Dale Walters R. Johnson Zamir Punja Th. Jacobs Shabir Hussain Wani P. Vidhyasekaran F. Lamberti Dale R. Walters Library of Congress Library of Congress. Office for Subject Cataloging Policy R. Hammerschmidt Richard Robert Nelson

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the book covers in detail the principles and practices of conventional plant breeding as well as newer and recent biotechnological tools such as marker assisted selection and transgenic crops the book is suitable for use as an advanced text a basic knowledge of plant pathogens insect pests and their genetics is assumed in addition the book can be used as reference book by plant pathologists entomologists and geneticists engaged in developing germplasm with resistance to biotic stresses attempts have been made to draw specific

examples from as many different crop plants and their harmful parasites as possible and an extensive reference list provides access to the original literature

disease resistance in plants second edition looks at genetic epidemiologic biochemical and biometric principles for developing new cultivars possessing genetic resistance to diseases it examines the nature of disease resistance and resistance genes and it highlights the importance of stabilizing selection sugar biotrophy and necrotrophy to obtain the greatest possible yields organized into 17 chapters this volume begins with an overview of disease resistance in plants and the ways to develop disease resistant variants it then discusses unspecific resistance the resistance gene paradox susceptibility and resistance within narrow host taxa phenotypic variation and gene numbers in host plants discontinuous variation and cytoplasmic inheritance and experimental difficulties in partitioning variance the reader is also introduced to epistasis and the structure of virulence in pathogens the notion of physiological race how the pathogen adapts to the host mutation in the pathogen from avirulence to virulence horizontal and vertical resistance to disease and its epidemiological effects and the link between protein polymorphism and vertical resistance in addition the book discusses genes for susceptibility in the host versus genes for avirulence or virulence in the pathogen sink induced loss of resistance high sugar disease processes and biotrophy slow rusting of cereal crops plant resistance against endemic disease and the accumulation of resistance genes in heterogeneous host populations this book will be useful to plant pathologists and plant breeders

plant pathogen interactions is a rapidly developing area among the plant sciences molecular genetics has provided the tools to analyse and manipulate mechanisms of pathogenicity and resistance responses and has facilitated their study from the population to the molecular level the book brings together the views of experts in the field and provides an overview of the genetic basis of interactions between fungi bacteria viruses and their host plants the triggering of plant defences and the complex array of plant responses to stop pathogen invasion as well as possible applications for improved plant protection the chapters are organised and written to make an advanced textbook rather than simply a collection of reviews or something resembling conference proceedings thus authors have largely concentrated on a didactic approach and the book should remain useable for several years in spite of the rapid progress in research the text is aimed at advanced students in the field of plant pathology as well as researchers requiring an integrated picture of plant resistance to pathogens

part 1 analysis and inheritance of resistance variation chapters by george g kennedy and james d barbour john a barrett ellen l simms and mark a rausher and mary r berenbaum and arthur r zangerl part 2 evolutionary responses to plant resistance by herbivores and pathogens chapters by lawrence wilhoit diana pilson arthur e weis and james groth and barbara christ part 3 population and community responses to plant resistance variation chapters by richard karban a joseph pollard robert s fritz and j daniel hare part 4 evolution of plant

resistancerobert j marquis helen m alexander matthew a parker arthur r zangeri and fahkri a bazzaz ellen l simms and janis antonovicsreferences copyright libri gmbh all rights reserved

plants have developed very sophisticated mechanisms to combat pathogens and pests using the least amount of reserved or generated energy possible. They do this by activating major defense mechanisms after recognition of the organisms that are considered to be detrimental to their survival. Therefore, they have been able to exist on earth longer than any other higher organisms. It has been known for the past century that plants carry genetic information for inherited resistance against many pathogenic organisms including fungi, bacteria, and viruses, and that the relationship between pathogenic organisms and hosts (plants) are rather complex and in some cases time dependent. This genetic information has been the basis for breeding for resistance that has been employed by plant breeders to develop better yielding disease resistant varieties, some of which are still being cultivated. Single gene resistance is one type of resistance which has been extensively studied by many research groups all around the world using biotechnological methodologies that have been the subject of many books and journal articles. Therefore, it is beyond the scope of this book. This type of resistance is very effective although it can be overcome by the pressure of pathogenic organisms since it depends on interaction of a single elicitor molecule from the pathogen with a single receptor site in the host.

Plant diseases worldwide are responsible for billions of dollars worth of crop losses every year. With less agrochemicals being used and less new fungicides coming on the market due to environmental concerns, more effort is now being put into the use of genetic potential of plants for pathogen resistance and the development of induced or acquired resistance as an environmentally safe means of disease control. This comprehensive book examines in depth the development and exploitation of induced resistance. Chapters review current knowledge of the agents that can elicit induced resistance, genomics, signalling cascades, mechanisms of defence to pests and pathogens, and molecular tools. Further chapters consider the topical application of inducers for disease control, microbial induction of pathogen resistance, transgenic approaches, pathogen population biology, trade offs associated with induced resistance, and integration of induced resistance in crop protection. The book concludes with a consideration of socio-economic drivers determining the use of induced resistance and the future of induced resistance in crop protection.

There is an increasing need for an understanding of the fundamental processes involved in the mechanisms by which disease resistances are introduced into crop plants. This book provides a wide ranging coverage of the successes and failures of the classical techniques, it describes the advances towards modern technology and addresses the problems of pathogen variation. Crop plants that are considered include cereals (wheat, barley, rice), potatoes, vegetables, and soft fruits.

up to date accurate information on recent developments in crop protection fungal disease resistance in plants biochemistry molecular biology and genetic engineering presents the latest developments in crop protection from fungal infection leading experts in botany plant breeding and plant pathology contribute their knowledge to help reduce and possibly prevent new outbreaks of devastating crop epidemics caused by fungi with exciting new advances in molecular biology biochemistry and genetic engineering this informative book will help researchers professors and students further their understanding of plant defenses fungal disease resistance in plants is your guide to understanding the various barriers that plants have developed through evolution and adaptation to protect themselves from invading fungal pathogens defenses include physical barriers such as thick cell walls and chemical compounds expressed by the plant when attacked still other plants have acquired proteins that play an important role in defense this book discusses these evolutionary traits and introduces new scientific techniques to engineer resistance in plants that have no built in protection fungal disease resistance in plants explores cellular expression of resistance to fungal pathogens the hypersensitive response and its role in disease resistance induced plant resistance to fungal pathogens mechanisms and practical applications pathogenesis related proteins and their roles in resistance to fungal pathogens signal transduction plant networks delivery and response to fungal infection fungus genes as they relate to disease susceptibility and resistance without intense research and scientific study catastrophic harvest failures due to fungal diseases could cause food shortages human and animal poisonings and economic loss throughout the world augmented with tables figures and extensive references this state of the art source of research material is valuable for scientists and researchers in universities private organizations government institutions and agricultural organizations interested in plant defenses and future crop preservation

from february 24 28 1992 an international symposium on durability of disease resistance was held at the international agricultural centre in wageningen the netherlands the symposium organized by the department of plant breeding of wageningen agricultural university and the centre for plant breeding and reproduction research cpro dlo was part of the dgis funded programme durable resistance in developing countries without any form of prevention or protection nearly all crops will be seriously or even severely damaged by a range of pathogens in modern agriculture man has been able to control many if not most pathogens using i pesticides ii phyto sanitary methods such as control of seed and plant material in order to start a crop disease free iii agronomic measures such as crop rotation iv disease resistance or combinations of these measures over the years the use of pesticides has increased enormously and so did the problems associated with pesticide use such as environmental pollution and building of resistance and tolerance to these pesticides in the pathogens the use of resistance too increased strongly over the years and here too problems arose

human population is escalating at an enormous pace and is estimated to reach 9.7 billion by 2050 as a result

there will be an increase in demand for agricultural production by 60 110 between the years 2005 and 2050 at the global level the number will be even more drastic in the developing world pathogens animals and weeds are altogether responsible for between 20 to 40 of global agricultural productivity decrease as such managing disease development in plants continues to be a major strategy to ensure adequate food supply for the world accordingly both the public and private sectors are moving to harness the tools and paradigms that promise resistance against pests and diseases while the next generation of disease resistance research is progressing maximum disease resistance traits are expected to be polygenic in nature and controlled by selective genes positioned at putative quantitative trait loci qtls it has also been realized that sources of resistance are generally found in wild relatives or cultivars of lesser agronomic significance however introgression of disease resistance traits into commercial crop varieties typically involves many generations of backcrossing to transmit a promising genotype molecular marker assisted breeding mab has been found to facilitate the pre selection of traits even prior to their expression to date researchers have utilized disease resistance genes r genes in different crops including cereals pulses and oilseeds and other economically important plants to improve productivity interestingly comparison of different r genes that empower plants to resist an array of pathogens has led to the realization that the proteins encoded by these genes have numerous features in common the above observation therefore suggests that plants may have co evolved signal transduction pathways to adopt resistance against a wide range of divergent pathogens a better understanding of the molecular mechanisms necessary for pathogen identification and a thorough dissection of the cellular responses to biotic stresses will certainly open new vistas for sustainable crop disease management this book summarizes the recent advances in molecular and genetic techniques that have been successfully applied to impart disease resistance for plants and crops it integrates the contributions from plant scientists targeting disease resistance mechanisms using molecular genetic and genomic approaches this collection therefore serves as a reference source for scientists academicians and post graduate students interested in or are actively engaged in dissecting disease resistance in plants using advanced genetic tools

examine the most recent developments in molecular plant pathology this comprehensive reference book describes the molecular biology of plant pathogen interactions in depth with dr vidhyasekaran s keen insights and experienced critical viewpoint bacterial disease resistance in plants molecular biology and biotechnological applications not only presents reviews of current research but goes on to suggest future research strategies to exploit the studies in interventions with biotechnological commercial and field applications this extraordinarily well referenced book delivers in depth examinations of the molecular recognition process between plants and bacterial pathogens bacterial genes involved in the recognition process hrp avr dsp and hsv genes the transcription of bacterial genes in plants signal transduction systems in bacteria and plants the functions of resistance genes and defense genes at the molecular level the elicitor molecules of bacterial pathogens and plants and their interactions plant and bacterial cell wall modifications

and their role in triggering host defense mechanisms bacterial disease resistance in plants also explores active oxygen species inducible plant proteins and their signals and transcription mechanisms inducible secondary metabolites and more it introduces novel strategies for bacterial disease management using genes from human beings birds crabs insects fungi bacteria and bacteriophages and genetic engineering techniques that can be used to develop transgenic disease resistant plants generously illustrated with figures and tables that make the data more quickly understandable bacterial disease resistance in plants will be an invaluable resource and textbook for plant pathologists bacteriologists botanists plant physiologists plant molecular biologists microbiologists biochemists plant cell and applied biologists genetic engineers and graduate level students in these disciplines

plant diseases and pests are a major constraint to agricultural production despite the various measures used to control them chemical control although often effective may pose environmental hazards and is relatively expensive especially in developing countries where it may be completely uneconomic control through genetically mediated resistance to diseases and pests is both cheap and environmentally safe and at present most diseases and pests of staple food crops are controlled through some form of resistance one of the basic problems in the use of resistance is its frequent lack of durability very often a type of resistance is used that breaks down after a certain period the temporary nature of this resistance due to the development of new strains of pest or pathogen able to overcome it has seriously hindered the improvement of the yield potential of many crops as a continuing effort is needed to replace old cultivars whose resistance has failed with new ones following vanderplank's now classical publications 1963 1968 which differentiated horizontal and vertical resistance studies on several host parasite systems have shown that different types of resistance can be distinguished genetically and epidemiologically and on the ability of the pests or pathogens to adapt to them a knowledge of how resistance operates at the population level has also opened up possibilities of managing relatively simple resistance types in such a way that a stable host pathogen system can be produced with a minimum of crop loss

induced resistance offers the prospect of broad spectrum long lasting and potentially environmentally benign disease and pest control in plants induced resistance for plant defense 2e provides a comprehensive account of the subject encompassing the underlying science and methodology as well as research on application of the phenomenon in practice the second edition of this important book includes updated coverage of cellular aspects of induced resistance including signalling and defenses costs and trade offs associated with the expression of induced resistance research aimed at integrating induced resistance into crop protection practice and induced resistance from a commercial perspective current thinking on how beneficial microbes induce resistance in plants has been included in the second edition the 14 chapters in this book have been written by internationally respected researchers and edited by three editors with considerable experience of

working on induced resistance like its predecessor the second edition of induced resistance for plant defense will be of great interest to plant pathologists plant cell and molecular biologists agricultural scientists crop protection specialists and personnel in the agrochemical industry all libraries in universities and research establishments where biological agricultural horticultural and forest sciences are studied and taught should have copies of this book on their shelves

induced or acquired resistance to disease in plants has been known for many years but the phenomenon was studied in only a few laboratories until about a decade ago since then there has been an increasing interest in induced resistance as a new environmentally safe means of disease control as well as a model for the study of the genes involved in host defence and the signals that control them this increased interest led the editors of induced resistance to disease in plants to collect and summarise much of the current and older literature on the topic in a single volume each chapter covers its topic as comprehensively as possible thus serving as a solid introduction to the literature as well as expressing its writer's own views on the state of research in the area and giving an indication of where future research may lead induced resistance to disease in plants addresses the biology of induced resistance in legumes solanaceae cucurbits and monocots since these are the families that have received the most attention followed by a discussion of the molecular basis of induced resistance its genetic and evolutionary significance and practical applications in disease control the book will provide a background for those commencing work in the area as well as a source of information for established workers who wish to learn about other areas of induced resistance

introduction the meaning of disease resistance in plants the detection and stability of disease resistance pathogen variation and host resistance the use of resistance genes to curb population shifts in plant pathogens the limits of disease control by genetic means breeding methods for disease resistance rice crucifers peas tomatoes apples forest trees

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