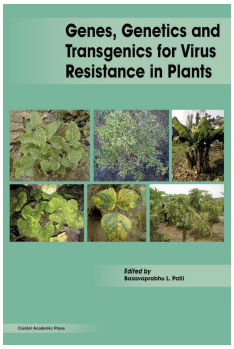
Genes, Genetics and Transgenics for Virus Resistance in Plants



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Viral diseases of crop plants cause significant yield and economic losses and this poses a major threat to global food security. To make matters worse there are no effective antiviral chemicals available and, although naturally resistant host genotypes exist, they are so rare that conventional breeding techniques cannot be used reliably to create resistant plants. The most effective option to combat phytopathogenic viruses is through biotechnological intervention, such as the use of genetic engineering to develop transgenic plants or the topical use of RNA silencing technologies to prevent or modulate the severity of the viral infection. Since the first report on the virus resistance of transgenic tobacco plants in 1986, enormous progress has been made in this field. In addition great strides have been made in our ability to genetically manipulate plants and viruses leading to a plethora of novel applications. This has prompted the need for this timely book which distills the most important research to provide a timely overview.

This authoritative book contains fifteen chapters whose breadth reflects the diversity of this research area. Topics covered range from: understanding the mechanisms of virus resistance in plants, and the management of whitefly-transmitted viruses, to the principles and methods involved in genetic engineering of virus resistant plants. Other chapters cover individual crops such as papaya, cassava, rice, tomato, and banana, for which virus resistance has been accomplished by employing different transgenic technologies.

This volume is essential reading for everyone working in this field, both students and specialists, from academia, research institutes/organizations and industries.

Chapter 1. Mechanisms of virus resistance in plants *(M. E. Chrissie Rey and Vincent N. Fondong)*
Chapter 2. Role of host transcription factors in modulating defense response during plant-virus interaction *(Saurabh Pandey, Pranav P Sahu, Ritika Kulshreshtha and Manoj Prasad)*
Chapter 3. Surfacing the role of epigenetics in host-virus interaction *(Namisha Sharma, Pranav P Sahu, Ritika Kulshreshtha and Manoj Prasad)*
Chapter 4. Molecular markers as tools for identification and introgression of virus-resistant genes *(Mamta Sharma, Avijit Tarafdar, Sharath Chandran, Devashish R. Chobe and Raju Ghosh)*
Chapter 5. Genetic engineering for virus resistance in plants: principles and methods *(Basavaprabhu L. Patil)*
Chapter 6. Tools and techniques for production of double-stranded RNA and its application for management of plant viral diseases *(Andreas E. Voloudakis, Maria C. Holeva, Athanasios Kaldis and Dongho Kim)*
Chapter 7. Transgenic virus-resistant papaya: current status and future trends *(Gustavo Fermin, Paula Tennant and Sudeshna Mazumdar-Leighton)*
Chapter 8. Development and delivery of transgenic virus-resistant cassava in East Africa *(Henry Wagaba, Andrew Kiggundu and Nigel Taylor)*
Chapter 9. Viruses infecting rice and their transgenic control *(Gaurav Kumar, Shweta Sharma and Indranil Dasgupta)*
Chapter 10. Whitefly-transmitted begomoviruses and advances in the control of their vectors *(Surapathrudu Kanakala and Murad Ghanim)*
Chapter 11. Virus resistant transgenic tomato: current status and future prospects *(S.V. Ramesh and Shelly Praveen)*
Chapter 12. Management of geminiviruses focussing on small RNAs in tomato *(Archana Singh and Sunil Kumar Mukherjee)*
Chapter 13. Viruses infecting banana and their transgenic management *(Ramasamy Selvarajan, Chelliah Anuradha, Velusamy Balasubramanian, Sivalingam Elayabalan and Kanicheluam Prasanya Selvam)*
Chapter 14. Virus-induced gene silencing (VIGS) and its applications *(Deep Ratan Kumar, Tejbhan Saini and Radhamani Anandalakshmi)*
Chapter 15. Possible strategies for establishment of VIGS protocol in chickpea *(Ranjita Sinha and Muthappa Senthil-Kumar)*

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