



Plant-Microbe Interaction - Recent Advances in Molecular and Biochemical Approaches

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Chapter 14 - Manipulation of cell wall components and enzymes on plant-microbe interactions

B. Varalakshmi^a, V. Suganya^a, A. Shanmugapriya^a, T. Karpagam^a, S. Jannathul Firdous^b, R. Manikandan^a, R. Sridevi^a, V. Saradhasri^a, M. Abinaya^a

^a Department of Biochemistry, Shrimati Indira Gandhi College, Tiruchirappalli, Tamilnadu, India

^b Faculty of Medicine, Universiti Kuala Lumpur Royal College of Medicine Perak, Ipoh, Malaysia

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Abstract

Plants encounter many biotic stresses such as infection by viruses, bacteria, fungi, and oomycetes during their life period which results in a huge loss of yield on agricultural crops. The cell wall of a plant is a dynamic assembly composed of polysaccharides and proteins. Cell wall provides a first-line defense against invading microbes to elicit an immune response. The degree of defense reactions between plants and invading microbes varies from plant to plant. The complexity of plant cell wall structures and composition has forced the microbes to develop a huge range of cell wall-degrading proteins and hydrolases to degrade cell wall components in order to overcome plants' defense mechanisms. Plants in course of time have developed various reciprocatory evolutionary adaptations to strengthen the plant immune system, by activating signaling pathways to recognize pathogen, examine and modify the composition, quantity and distribution of the cell wall polysaccharides, and their modifying enzymes to protect cell wall structure and function. Thus,

there exists a battle between plant and pathogenic microbes. If the plant wins the plant can survive and if the pathogenic microbe wins it will colonize the plant and the plant gets diseased. A set of signaling pathways are activated in plants in response to invading pathogenic nonself-danger molecules to develop innate immunity, these molecules are known as pathogen-associated molecular patterns (PAMPs) and the immunity developed is known as PAMP-triggered immunity (PTI). If the microbe overcomes this immunity plants then provoke a second-line of immunity known as effector-triggered immunity (ETI). The effector molecules are nothing but the degraded components of the cell wall and other self-molecules of plants. These effectors then stimulate R-genes and the R-gene products to initiate the ETI, which ultimately leads to a hypersensitive response (HR) involving apoptosis (programmed cell death) preventing further disease development. The term “resistance” is defined as the incompetence of a pathogenic microbe to grow and multiply in order to finish its life cycle on that plant. There are two types of resistance developed by plants host resistance and nonhost resistance. PAMP recognition plays a vital role in provoking nonhost resistance in plants. DAMP-mediated immune response is the base for the development of host resistance or R-gene-mediated resistance in plants. This chapter is an attempt to better understand defensive interactions between plants and microbes. The understanding is vital to develop disease-resistant crop plants for crop improvement.

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2024, Journal of Fungi

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