ABSTRACT

"Plant immunity: it's the hormones talking, but what do they say?"

Prof Corné Pieterse
Plant-Microbe Interactions
Dept. of Biology, Faculty of Science
Utrecht University
THE NETHERLANDS

Plants live in complex environments in which they intimately interact with a broad range of other organisms. Besides the plethora of deleterious interactions with pathogens and insect herbivores, relationships with beneficial microorganisms are frequent in nature as well, improving plant growth or helping the plant to overcome stress. The evolutionary arms race between plants and their enemies provided plants with a highly sophisticated defense system that, like the animal innate immune system, recognizes non-self molecules or signals from injured cells, and responds by activating an effective immune response against the invader encountered. Recent advances in plant immunity research underpin the pivotal role of cross-communicating hormones in the regulation of the plant's defense signaling network. Their powerful regulatory potential allows the plant to quickly adapt to its hostile environment and to utilize its resources in a cost-efficient manner. Plant enemies on the other hand, can hijack the plant's defense signaling network for their own benefit by affecting hormone homeostasis to antagonize the host immune response. Similarly, beneficial microbes actively interfere with hormone-regulated immune responses to avoid being recognized as an alien organism. In nature, plants simultaneously or sequentially interact with multiple beneficial and antagonistic organisms with very different lifestyles. However, knowledge on how the hormone-regulated plant immune signaling network functions during multi-species interactions is still in its infancy. In the past years, various genomics approaches expanded our understanding of the molecular mechanisms by which plants tailor their defense response to pathogen and insect attack. Diverse hormones such as salicylic acid (SA), jasmonic acid (JA) and ethylene (ET) play pivotal roles in the regulation of the defense signaling network. Our research is focused on the molecular interplay between these hormones and how their interactions steer the final outcome of the plant immune response.