Plant Pathology Seminar Series

"Defense Priming in Plants: Molecular Principles and Inheritance"

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As sessile organisms, plants live in dynamic environments subjected to numerous biotic and abiotic stresses. These include pathogenic microorganisms, drought, temperature extremes, soil salinity, nutrient deficiency, etc. All these factors affect plant development, crop yield, and crop sustainability and, therefore, constitute a major constraint to agricultural production. Remarkably, plants have the resiliency to cope with such challenges, thereby allowing them to adapt with biotic and abiotic stresses. Repeated exposure to environmental stresses trigger plant defense responses, such that plants can retain 'stress memory' of past exposure to the same. This phenomenon is termed as 'defense priming', where transient exposure to stress can lead to enhanced defense upon re-exposure to biotic or abiotic stress (1, 2, 6). A number of molecular mechanisms for defense priming have been elucidated over the years. Scientific evidence has shown accumulation of dormant Mitogen-activated Protein Kinases (MAPKs), elevated levels of Pattern Recognition Receptors (PRRs), and alterations in chromatin organization as the major molecular responses to defense priming (2, 4, 8). There is also evidence supporting stable transgenerational inheritance of these molecular changes from plants subjected to priming (5, 7). At present, cropping practices incorporate a number of chemical and biological priming agents that effectively mediate tolerance to biotic and abiotic stress (2, 8). A promising strategy to improve stress tolerance in plants may be targeted modification of the epigenome by activation of priming responses of the plant to various biotic or abiotic stress stimuli (3, 4). Defense priming has great potential in crop improvement against environmental stresses, while preserving the plant growth and productivity phenotypes.

4:10 pm | Monday, September 18 | Johnson Hall 343

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