

Plant Pathology Seminar Series

Molecular Features of the (In-)compatibility between Potato and Potato virus y

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Abstract:

Viral phytopathogens attack a wide range of crops worldwide, resulting in economic losses of nearly US\$60 billion annually. In potato (*Solanum tuberosum* L.), the most devastating crop losses are caused by potato virus Y (PVY). Until recently, resistant cultivars have been used as the most cost-effective and reliable option for managing PVY in potato. However, the current arsenal of genetic resistance appears inadequate for combating the recent emergence of more aggressive strains such as PVY^{NTN} and PVY^{N-Wi}. Developing effective genetic resistance to these strains would greatly benefit from an in-depth picture of the strategies they use that result in host susceptibility. Thus, the goal of this dissertation was to gain a system-wide view of the changes occurring in potato after infection with these necrotic strains. For this, gas chromatography coupled with mass spectroscopy (GC-MS) was first used for an untargeted investigation of the changes in leaf metabolomes of PVY-resistant cultivar Premier Russet, and a susceptible cultivar, Russet Burbank, following inoculation with PVY^{NTN}, PVY^{N-Wi}, and their common progenitor PVY^O. Subsequently, the transcriptional responses of these inoculated plants were then examined using RNA-seq. At the metabolome level, the analysis showed PVY infections in potato elicit detectable changes in several primary metabolic pathways related to amino acid, energy, and fatty acid metabolism. In the resistant cv. Premier Russet, a major overlap in differential accumulation was found between PVY^{N-Wi} and PVY^O. In contrast, the main overlap in differential metabolite profiles and pathways in the susceptible cv. Russet Burbank was between PVY^{NTN} and PVY^O. Overall, limited overlap was observed between PVY^{NTN} and PVY^{N-Wi}, suggesting that PVY^{N-Wi}-induced necrosis may be mechanistically distinguishable from that of PVY^{NTN}. At the transcriptome level, primary metabolism was also shown to be affected by all three PVY inoculations. In addition, the analysis also recovered a core set of 9 pathways of secondary metabolism that may confer the PVY susceptibility in Russet Burbank. As a whole, these pathways can potentially be targeted for developing genetic resistance in potato and other economically important Solanaceous PVY host.

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Zoom Link: <https://wsu.zoom.us/j/95501196325?pwd=aGdCeTZGM0pQaXZoY05qT3M0SFVHQ09>

Meeting ID: 955 0119 6325 Passcode: 5498

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