

WSU Plant Pathology Seminar

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Exploring the Spatial Dynamics of Host Defense Mechanisms in Canola During *Sclerotinia sclerotiorum* Infection



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Abstract: *Sclerotinia* stem rot, caused by *Sclerotinia sclerotiorum*, is a major threat to crops like *Brassica napus* (canola) worldwide. This pathogen employs a necrotrophic lifestyle, initiating infection by suppressing plant defenses, leading to necrosis and tissue breakdown. Our study explores the dynamic interaction between the plant and pathogen, particularly focusing on "margin zone" —the critical area between healthy and diseased necrotic tissue where the plant ramps up its defenses while the pathogen attempt assault. Interestingly, chlorosis was more pronounced the margin zone infected with an oxalate-deficient *S. sclerotinia* mutant (M202) than in those infected with the wild-type strain. RNA-seq analysis showed different gene expression patterns during infection, especially in Light Harvesting Complex (LHC) genes linked to the xanthophyll cycle and chlorophyll degradation pathway. Metabolic profiling showed a significant increase in photoprotective metabolites involved in the xanthophyll cycle, specifically in the margin and necrotic zones during wild-type infection, and mainly in the margin zone during M202 mutant infection. Similarly, chlorophyll degradation pathway was also observed potentially impacting host immunity. RT-qPCR showed higher expression of genes involved in ABA biosynthesis, suggesting ABA accumulation, which may weaken immune responses and increase susceptibility to infection. Through the integrated study of genomic networks and metabolomic pathways, our research deciphers the complex plant defense mechanisms against necrotrophic pathogens, ultimately guiding the development of targeted strategies to enhance crop resistance.

Short biography of Dr. Hira Kamal

Hira Kamal (she/her) has been a postdoctoral research associate in the Department of Plant Pathology at Washington State University since 2020. She earned her PhD in Agricultural Biotechnology from the National Institute for Biotechnology and Genetic Engineering in Pakistan. Throughout her career, she has been awarded prestigious local and international fellowships (e.g., IRSIP) and has published over twenty research articles. Her research focuses on plant defense responses against biotic stresses, including pests, DNA/RNA viruses, soil-borne pathogens, and fungi. In addition to her research, Hira actively mentors graduate and undergraduate students and serves on recruitment events and committees within CAHNRS and plant pathology department. Outside of work, she enjoys spending time with her family, including her two children—her other full-time job.