Title: Understanding the role of the Plasminogen-Apple-Nematode domain in host-plant invasion by pathogens.

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Project Goals: The Secure Ecosystem Engineering and Design (SEED) Science Focus Area (SFA), led by Oak Ridge National Laboratory, combines unique resources and expertise in the biochemistry, genetics, and ecology of plant-microbe interactions with new approaches for analysis and manipulation of complex biological systems. The long-term objective is to develop a foundational understanding of how non-native microorganisms establish, spread, and impact ecosystems critical to U.S. Department of Energy missions. This knowledge will guide biosystems design for ecosystem engineering while providing the baseline understanding needed for risk assessment and decision-making.

Abstract Text: Invasive pathogens, causing diseases such as septoria stem canker caused by the fungal pathogen *Sphaerulina musiva*, negatively affect ecosystems and economies around the world. The exact mechanism by which these pathogens become established remains largely unknown, and most studies assume a predominant role by pathogen-derived factors in pathogenesis. In this project, we are investigating the role of susceptibility host-genes in the pathogenesis of *Populus* by *S. musiva*. A G-type-Lectin receptor-like kinase (G-type LecRLK) encoded in *Populus* was suggested to function as a susceptibility factor that enhanced infection by *S. musiva*. Subsequently, we demonstrated that the G-type LecRLK gene falls in the same category as proteins carrying the Plasminogen-Apple-Nematode (PAN) domain, which is highly implicated in cell invasion and pathogenesis parasitism. Herein, we will present evidence showing that this protein domain mediates receptor ubiquitination, cellular internalization, and proteolysis. We propose a model by which the cellular internalization of ubiquitinated receptors functions as an invasion platform for the pathogen to enter host cells. Identification of these genetic factors advances our ability to assess or modulate success of this invasive pathogen in *Populus*.

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