

Popular scientific summary of the docent lecture to be given by Ramesh Raju Vetukuri, Department of Plant Protection Biology, LTV Faculty

What makes oomycetes successful pathogens? It's all in the genes!

Fungal-like plant pathogens from the *Phytophthora* genus of oomycetes, cause billions of dollars in losses every year to agriculture. For example, potato late blight disease causes losses of over \$6 bn globally through yield losses and control measures alone. International trade, further fueled by global warming and rapid adaptation of pathogens to new environments, has facilitated the spread of invasive *Phytophthora* species around the world where they have started to cause havoc in agriculture, forestry and ecosystems. *Phytophthora* species that co-exist with their hosts in natural habitats can cause severe disease problems on plants in new habitats, as those plants often have no resistance to these new threats. Modern sequencing technologies such as next-generation sequencing are allowing us to make significant advances in our understanding of the biology of oomycete pathogens, by comparative genomics analyses. For example, we now know that oomycetes deliver an arsenal of disease promoting proteins called effectors into plant cells to suppress plant immunity and to establish diseases. Some of the core effectors are well conserved across different *Phytophthora* species making them ideal candidates for disease control. My research is aimed at exploiting genome and transcriptome sequence information for these pathogens to identify common and unique expressed effector proteins and novel targets for disease control. In addition to computational analysis, I also conduct laboratory experiments to test the functions of the predicted effector proteins as determinants of pathogenicity.

My main research questions are: 1) Do all pathogenic *Phytophthora* species employ similar effectors and strategies to cause diseases? 2) Does the *Phytophthora* pathogens deploy the same effectors across different plant hosts to cause disease. 3) How much sequence diversity is there between different *Phytophthora* species at DNA and protein levels? 4) What are the characteristics of species-specific effectors produced by different *Phytophthora* species? and 5) How can we exploit data from these studies for disease control? A deeper understanding of effectors, their specificities and how they cause disease will be critical for long-term control strategies against the devastating diseases caused by oomycetes.