The Cloning and Characterization of *Phytophthora*-inducible *PRR* genes from Tomato

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PAMP-triggered immunity (PTI) is one of two major disease resistance pathways present in the plant kingdom. This specific pathway involves pathogen associated molecular patterns (PAMPs), which are unique to the pathogens, and there detection by pattern recognition receptors (PRRs) in plants. PAMPs are specific to each class of microbe and required for a vital function, which prevents the microbe from quickly evolving to evade detection. Thus, the PRR-mediated resistance (PTI) is more durable than the resistance (R) gene-mediated disease (also call Effector-triggered immunity (ETI)). Fry lab at Cornell has recently found that 71 receptor-like kinase genes are induced during the tomato-*Phytophthora* interaction. Our further bioinformatics analysis indicated 17 of them contain extracellular LRR, transmembrane and kinase domains and thereby are putative *PRR* genes. Our research goal is to clone and over-express these PRR genes in tomato and potato plants and assess the possible altered resistance/susceptibility to *Phytophthora* accordingly.

My project involves the cloning and characterization of these 17 putative *PRR* genes from tomato. I have obtained the full length cDNAs of 11 genes from tomato by RT-PCR. One of these 11 cDNAs, Solyc02g091840.2.1 (1840), has been cloned into a binary vector for characterization in plant cells. Interestingly, I found that the 1840 protein (referred to by a 4 number version of its name due to space) is unstable and degraded by the ubiquitin-proteasome system (UPS) in plant cells. This suggests 1840 is fine-tuned on both transcriptional and post-translational levels. Given the fact that the 1840 protein is unstable and the 1840 gene is induced by pathogens, our findings give rise to a hypothesis that, during *Phytophthora* infection, plants need to quickly express this 1840 gene for more protein production in order to compensate its degradation. Thus, constitutive over-expression of the 1840 gene in tomato and potato might confer enhanced resistance to *Phyotophthora*.

I currently have initiated transformation of the construct (1840) into tomato and potato leaf explants for over-expression along with the construct (6110) which has shown to be stable in plant cells. The cloning of full length cDNA of 6990, 0890, 6320 and 2470 into a binary vector is in process.