Manipulation of PRR genes in tomato and potato

Plants use two types of receptor-associated immune systems to defend themselves against potential pathogens: pattern recognition receptor (PRR) -mediated resistance and disease resistance (R) gene-mediated resistance. The PRR-mediated resistance relies on the plant cell membrane-located PRR to perceive the pathogen-associated molecular patterns (PAMPs) of pathogens or the endogenous damage-associated molecular patterns (DAMPs) produced in response to pathogen attacks, whereas the R-mediated resistance is dependent on the recognition of pathogen effectors (called avirulence effectors) by R proteins.

One of the Arabidopsis PRR genes, PEPR1, recognizes Arabidopsis endogenous PEP1peptide that is produced in response to pathogen attacks. However, tomato and potato do not possess the PEPR1 gene. We have generated transgenic potato and tomato plants heterogeneously over-expressing the Arabidopsis PEPR1 gene and the preliminary Phytophthora assay indicated these transgenic plants exhibit partial resistance to P. infestans. Recently, a second pep1-recognizing PEPR gene (termed PEPR2) has been identified in Arabidopsis, which promoted us to introduce the second PEPR2 into transgenic tomato and potato that already has PEPR1. Thus, our goal is to heterogeneously over-express both PEPR1 and PEPR2 in tomato and potato plants for possible enhanced resistance to P. infestans.

In addition, I have been working with characterization of four PRR genes from tomato. These PRRs (termed 7130, 1820, 6100 and 6320) were originally found in Fry lab at Cornell to be induced by P. infestans infection. These four PRRs have been successfully cloned into a binary vector and Western blotting is currently undergoing to verify the expression of these PRRs in plant cells.