

Junyi Tan

Research Proposal Seminar

March 16, 2018 3:30 pm

Moore Hall Room 351

## **Thesis Project**

### **Molecular Mechanisms of Multiple Disease Resistances**

#### **Conferred by Cucumber Staygreen Gene (*CsSGR*)**

The Gy14 cucumber possesses resistance to the oomycete downy mildew (DM, pre-2004 strain), the fungal anthracnose (AR) and the bacterial angular leaf spot (ALS) diseases that are controlled by the *dm1*, *cla*, and *psl* loci, respectively. Through QTL mapping, we have shown that the DM and AR resistance in Gy14 is conferred by the same gene, *CsSGR* (*staygreen*), which encodes the magnesium dechelatase in the chlorophyll degradation pathways. My preliminary work on QTL mapping of ALS resistance also suggested *CsSGR* as a candidate gene for the *psl* locus. The identity of *CsSGR* and the *psl/dm1/cla* locus will be further validated with map-based cloning. Its functions in host resistance against these pathogens will be all validated. We also hypothesize that the *CsSGR*-mediated multiple disease resistance is through the chlorophyll degradation pathway in which reactive oxygen species (ROS), catabolites from the chlorophyll breakdown, and microbial defense proteins may all contribute to suppression of pathogen growth. To prove this, near isogenic lines for the *psl/dm1/cla* locus will be developed which will be used to examine expression of genes in the chlorophyll degradation pathway, ROS and selected catabolite in NILs in responses to pathogen inoculation. The NILs will also be used for study phenotypic interactions between cucumber and the anthracnose pathogens and the regulatory network during these interactions.