Mapping resistance markers to Phytophthora capsici in chile peppers (Capsicum annuum)

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**Institution:** UC Davis  
**Crop:** Peppers

I am a PhD student at University of California Davis under Dr. Allen Van Deynze. My research is focused on breeding disease resistance to the oomycete pathogen Phytophthora capsici in pepper plants. This pathogen is a major problem in pepper production worldwide and it is estimated to cause annual losses of 41-49% in 1998-2002. One of the challenges to this pathogen are the many different strains (or races) found in a single location. My research includes mapping resistance Quantitative Trait Loci (QTL) to multiple strains of Phytophthora capsici and identifying molecular markers linked to these traits. Additionally, we are also examining the gene expression profile of resistant plants and comparing to the susceptible lines in order to identify candidate genes responsible for disease resistance. Results so far have found a major resistance factor on chromosome P5 as well as a minor resistance factor on chromosome P1. We have identified 5 Single Nucleotide Polymorphism (SNP) markers for the resistance factor on P5 that could potentially be used for breeding. These markers are currently being validated in different pepper populations to ensure good linkage between the trait and the marker. Additionally, this research provided the opportunity for undergraduate interns to setup and manage a research project from start to finish and learn the value of good experimental design and taking detailed notes. This also gave them exposure to the work that goes on in crop improvement.

Indicate all funding sources  
USDA – ARS  
State Funding  
UC Davis Department of Plant Science

What problem was addressed by this success?  
Disease or pest

Please indicate all stake holders that benefited from this success story  
Students  
Plant Breeders

Indicate the number of each type of participant in this success story  
Undergraduate Student: 3  
Graduate Students: 2  
Post Docs: 0  
Research Technicians: 0  
Other: 0

What are the outputs? Output = (product, goods and services resulting from success e.g. varieties or germplasm released, new genetic tools etc.)  
Validated molecular Single Nucleotide Polymorphism (SNP) markers publicly available to plant breeders.  
Germplasm release of resistant cultivar with associated molecular markers to use for marker assisted selection.

What are the impacts? Impact = (long term, sustainable change due to success story e.g. change in disease, yield, quality including acreage planted)  
Developing molecular markers tightly linked to disease resistance will assist breeders in making plant selections more efficiently. Breeding genetic resistance in peppers will reduce the amount of pesticides sprayed for this disease and ultimately save farmers money in production costs. Lastly, identifying the candidate gene(s) that convey resistance could potentially be used to clone or identify similar genes in other plant families.

Which category below best describes this success story?  
Capacity building (e.g. new courses, web sites, data base)