CAN PIERCE’S DISEASE PDR1 RESISTANCE INTROGRESSED INTO VITIS VINIFERA BE TRANSLOCATED FROM A RESISTANT ROOTSTOCK TO A SUSCEPTIBLE SCION?

Principal Investigator: Drake C. Stenger  
San Joaquin Valley Agric. Sci. Center  
USDA ARS  
Parlier, CA 93648  
drake.stenger@ars.usda.gov

Co-Principal Investigator: David W. Ramming  
San Joaquin Valley Agric. Sci. Center  
USDA ARS  
Parlier, CA 93648  
david.ramming@ars.usda.gov

Co-Principal Investigator: Elizabeth E. Rogers  
San Joaquin Valley Agric. Sci. Center  
USDA ARS  
Parlier, CA 93648  
elizabeth.rogers@ars.usda.gov

Reporting Period: The results reported here are from work conducted August 2011 to October 2011.

ABSTRACT
The goal of this research is to evaluate the potential of a non-transgenic, Pierce’s disease (PD) resistant Vitis vinifera selection used as an experimental rootstock to confer systemic resistance to PD susceptible V. vinifera scions. Source of PD susceptible plant material will be the wine grape variety ‘Chardonnay’, known to support high populations of Xylella fastidiosa (Xf) and exhibit severe PD symptoms. Source of PD resistant material will be a modified backcross generation 2 (mBC2) raisin selection with PD resistance locus PdR1 introgressed from 89-F0908 (V. rupestris X V. arizonica). Scions will be mechanically inoculated with Xf strain Stags Leap. PD severity will be visually assessed using a nominal 0-5 rating scale where 0 corresponds to no visual symptoms and 5 corresponds to death of the plant. Following development of PD symptoms on the positive control (‘Chardonnay’ as both scion and rootstock), anticipated to be ~12-16 weeks post inoculation, tissue samples (petioles) will be assayed for Xf titer by real-time PCR.

Layperson Summary
Pierce’s disease (PD) resistance from a wild grapevine species has been transferred into Vitis vinifera via classical (non-transgenic) breeding. However, given the extensive number of wine, raisin, and table grape varieties susceptible to PD, introgression into each will be time consuming and costly. In this research, proof of concept experiments will be conducted in greenhouse trials to determine if PD resistance in a V. vinifera selection used as a rootstock may be translocated to susceptible V. vinifera scions.

INTRODUCTION
This new project describes pilot experiments designed to test the hypothesis that a Pierce’s disease (PD) resistant rootstock can affect PD development in susceptible scions. It is known that rootstock selection can affect symptom expression resulting from Xylella, Fastidiosa (Xf) infection of peach and citrus (Gould et al., 1991; He et al., 2000), and these observations were used as a rationale by Cousins and Goolsby (2010) to initiate examination of five grape rootstocks for potential to reduce PD symptoms in susceptible scions. The V. vinifera selection to be used as an experimental rootstock bears the PdR1 resistance locus introgressed from 89-F0908 (V. rupestris X V. arizonica) that is known to confer high levels of PD resistance via reduction of Xf population levels (Buzkan et al., 2005; Krivanek et al., 2006; Riaz et al., 2009) and xylem sap from PdR1 plants reduce growth of Xf in culture (Cheng et al., 2009). As the PdR1 resistant rootstock to be used in these experiments is a second generation backcross with a genetic composition of ~87.5% Vitis vinifera, difficulties encountered by Lin and Walker (2004) in establishing sound graft unions between V. vinifera scions and rootstocks derived from wild Vitis species should be eliminated. The simple experimental design to be used will determine whether or not the PdR1 resistance factor(s) is (are) capable of systemic protection of tissues beyond the graft union to affect pathogenesis of Xf in susceptible scions.

OBJECTIVE
Determine effect of rootstock genetic background (+/- PdR1) on disease severity and Xf population levels in PD susceptible scions following challenge inoculation of scions with Xf.

RESULTS AND DISCUSSION
Data are not yet available for this newly funded project.

CONCLUSIONS
No conclusions may be drawn at this time.

REFERENCES CITED


FUNDING AGENCIES
Funding for this project was provided by the CDFA Pierce’s Disease and Glassy-winged Sharpshooter Board.