

FIELD EVALUATION OF PIERCE'S DISEASE RESISTANCE OF VARIOUS DSF-PRODUCING GRAPE VARIETIES AS SCIONS AND ROOTSTOCKS

PRINCIPAL INVESTIGATOR:

Steven Lindow
University of California
Department of Plant and Microbial Biology
111 Koshland Hall
Berkeley, CA 94720-3102
icelab@berkeley.edu
510-642-4174

COOPERATORS:

Renee Koutsoukis
University of California
Department of Plant and Microbial Biology
111 Koshland Hall
Berkeley, CA 94720-3102
510-643 6498

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INTRODUCTION

A cell density-dependent gene expression system in *X. fastidiosa* (*Xf*) is mediated by a family of small signal molecules called diffusible signal factor (DSF) which we have now characterized as 2-Z-tetradecenoic acid (hereafter called C14-cis) and 2-Z-hexadecenoic acid (C16-cis). The accumulation of DSF attenuates the virulence of *Xf* by stimulating the expression of cell surface adhesins such as HxfA, HxfB, Xada, and FimA (that make cells sticky and hence suppress its movement in the plant) while down-regulating the production of secreted enzymes such as polygalacturonase and endoglucanase which are required for digestion of piths and thus for movement through the plant. Artificially increasing DSF levels in transgenic plants by expressing the gene for the DSF synthase from *Xf*, *rpfF*, was found to be highly effective in reducing disease severity of inoculated plants when used as scions and to confer at least partial control of disease when used as rootstocks. Results from earlier field trials in which only a limited number of grape varieties were evaluated in Solano County and Riverside County provided strong evidence that pathogen confusion can confer high levels of disease control - both to plants artificially inoculated had Solano County, and especially to plants infected naturally with infested sharpshooter vectors. The earlier work therefore has provided support that this strategy is a useful one for managing Pierce's disease. This ongoing study was therefore designed primarily to evaluate the robustness and general applicability of this strategy of disease control in a wide variety of grape varieties.

ACCOMPLISHMENTS:

- Expression of an untargeted variant of RpfF from *Xylella fastidiosa* was achieved in the rootstock varieties Richter 110, Paulsen 1103, Milardet et de Grasset 101-14, and Freedom, as well as Thompson Seedless
- Expression of a chloroplast-targeted variant of RpfF from *Xylella fastidiosa* was achieved in Thompson Seedless
- The most highly resistant transformed grape lines to Pierce's disease were identified in greenhouse testing after inoculation with *Xylella fastidiosa*
- Cabernet Sauvignon scions were grafted to each of these various transgenic lines which served as rootstocks, as well as onto untransformed lines of each of these varieties
- Sufficient numbers of grafted transgenic lines as well as grafted non-transgenic lines of each of these transgenic varieties as own-rooted transgenic and non-transgenic varieties were produced in the

greenhouse and planted into a field site at UC Davis August, 2019. Where they will be inoculated and subsequently evaluated beginning May, 2020.