

**Summary report for CDFA Agreement Number 17-0331-000-SA
Identification of grape cultivars and rootstocks with resistance to vine mealybug**

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Introduction

Mealybugs are soft-bodied, sap-sucking insect pests of grapevines and other plants that can transmit the economically important Grapevine Leaf Roll Associated Virus (GLRaV). Insecticides are the main form of mealybug control, but concern about the potential for insect resistance development and public health has necessitated the use of other forms of control. Mating disruption and parasitoids have been implemented with success in vineyards, however these forms of control are often more expensive. Resistant grapes, and specifically resistant rootstocks, could directly reduce mealybug populations developing or overwintering under the bark and on roots in the vineyard.

Objectives

The objective of this project is to develop a novel control strategy for vine mealybug using host resistance as part of an integrated management program. Identified grape material with resistance to vine mealybug will be further evaluated for use as rootstocks and traditional cultivar breeding.

Objective 1: Develop a method to evaluate mealybug host resistance and identify grape material with leaf resistance to vine mealybug.

Objective 2: Evaluate grape materials with identified resistance to vine mealybug.

Objective 3: Multi season sustainability of resistance to vine mealy bug in identified grape rootstocks and cultivars.

Highlights of the work performed

Objective 1: Develop a method to evaluate mealybug host resistance and identify grape material with leaf resistance to vine mealybug.

- *A vine mealybug colony was established*
- *Clip cages were constructed and tested on leaves in whole plants assays, high mortality among crawlers was observed*
- *Detached leaf assays were tested, but were discontinued due to high insect mortality*
- *Whole plant assays using bagged plants were determined to be superior and used for remaining studies*

Objective 2: Evaluate grape materials with resistance to vine mealybug.

- *Eleven potted grape cultivars/rootstocks were evaluated for susceptibility to vine mealybug in two separate replicated outdoor/field experiments*
- *Three sources of potential resistance were identified, RS-3, IAC 572, and 10-17A across the two experiments. These materials are publicly available for use as commercial rootstocks.*
- *Cabernet Sauvignon was more susceptible to vine mealybug than any of the rootstocks evaluated, but was not significantly different in susceptibility from cultivated wine and table grape cultivars, Chardonnay, Valley Pearl or Autumn King*
- *RS-3 and IAC 572, while both potential sources of resistance, appear to differ in the level and type of resistance/tolerance to vine mealybug. Differences in sources of resistance could provide grape breeders with the potential to stack sources of resistance from these sources*

Objective 3: Multi season sustainability of resistance to vine mealy bug in identified grape rootstocks and cultivars.

- *Ten potted accessions of grape cultivars/rootstocks/species were evaluated for host resistance to vine mealybug in an outdoor screen cage study*
- *Cabernet Sauvignon consistently had a greater number of vine mealybugs than any of the rootstocks or species evaluated in year 1 and year 2*
- *Populations of vine mealybug increased for each of the accessions evaluated from year 1 to year 2 including potential sources of resistance IAC 572 and 10-17A*
- *Vine mealybug did not overwinter on the roots of any of the accessions evaluated when evaluated at the end of the study in year 2*
- *High variability was observed in weekly mealybug counts due to large fluctuations in the number of stage 1 and 2 crawlers, ratings for Objective 2 were modified and now differentiate between stage 1st/2nd crawlers, stage 3 juveniles, and ovisacs.*