

**Title of Report:** Renewal Progress Report for CDFA Agreement Number 16-0616-SA (SPO Award #201602418)

**Title of Project:** Education and Outreach for the Grapevine Certification and Registration Program, and an Assessment of Recently Established Production Vines from Increase Blocks.

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**Reporting period:** The results reported here are from work conducted December 2016 to March 2017

**Introduction:**

Certified grapevine nursery stock consumers (grape producers) are concerned that the quality of the product they are purchasing from the clean plant program does not meet the standard they believe it should. Much of this concern stems from the expectation that certification offers something greater, in terms of freedom from virus contamination, than it scientifically can. With the discovery that GLRaV-3 is spreading in California, in addition to the discovery of *Grapevine red blotch associated virus* (GRBaV) (Al Rwahnih et al. 2013; Golino et al. 2008), grape producers question the quality of certified vines. There is good evidence that clean plant programs work and that they have large economic benefits that can be shared by all actors in the supply chain (Fuller *et al.*, 2015), but, as with all supply chains, in order for clean plant programs to work well, they require mutual trust between the actors in the chain. By defining the term “*certified*” according to the scientific sampling procedure and educating growers of the meaning of this term, we can bridge the current gap in perceptions that exists between the clean plant system and the purchasers of its products. However, because some viruses can be spread, unless a complete census of all certified vines was carried out every year, it is impossible for any certification program to reduce virus incidence to zero. The meaning of the term “certified” must be defined in relation to the statistical performance of the actual sampling plan used. In order for grower trust in the system to build, that meaning must be clearly articulated and appropriate expectations established for disease incidence in planting material emerging from a program using the definition. Additionally, it is unclear at this time what level of background infection per year occurs in nursery increase blocks as well as a lack of understanding of potential reinfection of increase blocks between sampling rotations. The intentions of this project are to provide quantifiable outreach and extension involving the certification program while addressing the background infection in nursery increase blocks and the potential reinfection in increase blocks between sampling bouts.

**Objectives:**

- A. To develop a grower information pack and slide presentation to summarize the Grape Certification and Registration Program
- B. Hold grower meetings in key grape-growing regions of California to explain the functioning and efficacy and limitations of the certification program
- C. To quantify the impact of education and outreach by issuing pre-test and post-test surveys at grower meetings
- D. To assess the level of potential contamination or reinfection in newly established vineyard blocks when material is sourced from increase blocks
- E. To assess the level of reinfection of leafroll-3 and Red Blotch viruses in increase blocks between certification sampling bouts

**Activities:**

- A. To develop a grower information pack and slide presentation to summarize the Grape Certification and Registration Program
  - a. Multiple slide presentations have been produced and presented in numerous parts of the state, including Bakersfield, Fresno, Paso Robles, Tulare, Lodi, San Diego and Davis, CA.
- B. Hold grower meetings in key grape-growing regions of California to explain the functioning and efficacy and limitations of the certification program
  - a. Meetings and presentations have been provided in order to notify the public of the potential for grower work group meetings in various parts of the state including the foothills, Bakersfield, Fresno, Paso Robles, Tulare, Lodi, San Diego and Davis, CA. Email notices have been delivered to specific industry leaders and farm advisors in order to begin scheduling work group meetings.
- C. To quantify the impact of education and outreach by issuing pre-test and post-test surveys at grower meetings
  - a. While discussing collaborative projects with Lynn Wunderlich, the farm advisor for Central Sierra Cooperative Extension, Lynn mentioned previous education and outreach presentations provided by Katherine Webb-Martinez, the current Associate Director of Program Planning and Evaluation in the UC Division of Agriculture and Natural Resources. Lynn and I contacted Katherine for more information on quantifying the impact of education and outreach. Her advice provided us the opportunity to more appropriately plan to assess impacts by way of a combination of retrospective pre-tests and post-tests. We are currently guiding our questions for the survey in that direction.
- D. To assess the level of potential contamination or reinfection in newly established vineyard blocks when material is sourced from increase blocks.
  - a. We are currently seeking access to vineyard blocks which meet these descriptions.
- E. To assess the level of reinfection of leafroll-3 and Red Blotch viruses in increase blocks between certification sampling bouts.
  - a. Joshua Kress at the CDFA has been contacted in order to access the diagnostic information when it becomes available.

**Publications produced and pending, and presentations made that relate to the funded project.****Publications:**

- Arnold, K. L., Golino, D., & McRoberts, N. (2016). A synoptic analysis of the temporal and spatial aspects of grapevine leafroll disease in an historic Napa vineyard and experimental vine blocks. *Phytopathology*. <http://dx.doi.org/10.1094/PHYTO-06-16-0235-R>
- Arnold, K.L., McRoberts, N. and Golino, D.A. (In press.) North coast virus survey reveals improving health of vineyards over decades. *California Agriculture*.

**Presentations:**

- “Maintaining Virus Free Vineyards” (this title was provided to me by the venue, I later explained that the intention is to reduce viruses in vineyards)
  - Presented at the American Vineyard Magazine Expos in November, 2016 in Turlock, Fresno, and Paso Robles, CA.
- “Viruses in Vineyards”
  - Presented at the Current Issues in Vineyard Health conference in November, 2016 in Davis, CA.
- “Education and Outreach for the California Grapevine Registration and Certification Program, and an Assessment of Recently Established Production Vines from Increase Blocks”
  - Presented at the Pierce’s Disease Research Symposium in December of 2016.

- “Viruses in Grapevines”
  - Presented at the Southern San Joaquin Valley Grape Symposium in January, 2017 in Bakersfield, CA.
- “Grape Virus Management”
  - Presented at the Current Wine and Winegrape Research conference in February, 2017 in Davis, CA.
- “Grape Virus Management”
  - Presented at the On the Road in Lodi conference in February, 2017 in Lodi, CA.

### **Research Relevance:**

Grapevine viruses and other internal pathogens have been related to vineyard problems long before we ever knew they were there. Many issues troubling growers in the 1930s were later attributed to Pierce’s Disease, fanleaf and leafroll (Bioletti 1931; Matthews 2012). Likely due to the immediate destructive nature of Pierce’s Disease as well as extensive outreach programs, growers in citrus and grapes combined their efforts to facilitate regional control of the vectors spreading the disease and the pathogen responsible for the disease decades ago. This type of effort has only recently been supported by industry for virus related issues like leafroll. For many years viruses were perceived by growers as non-problematic. This false perception is likely attributed to the fact that many vineyards were previously established on rootstocks like AXR#1 and St. George (Wolpert et al. 1994), both of which are associated to the reduction of virus symptom expression (Golino 1993). After the failure of AXR#1, alternative rootstocks with varying levels of disease tolerance were grafted onto infected budwood from existing fields which led to many virus related issues. It has taken decades since this turn in material to help growers understand the problems associated to certain viruses in vineyards in part due to the fact that virus symptoms are variable depending upon the season and different viruses cause different symptoms. Additionally, leafroll, a virus which reduces yield and limits sugar accumulation in the berry, easily spread from one vineyard block to the next via its’ primary vector, common mealybugs. Decades after the failure of AXR#1, a pilot workgroup began in Napa with the intentions of managing leafroll regionally due to the rigorous efforts of our team (those mentioned in the heading as well as Monica Cooper, the Farm Advisor of Napa County). After five years of monthly meetings where growers shared the challenges and successes of their endeavors, growers in Napa feel they have leafroll under control. With the consistent extension and outreach explaining these work groups, growers across California have grown interested in replicating these efforts in their region. The overall intention of this project is to provide this opportunity to all grape/wine grape growing regions in California so that in the future, our investment in certified, virus tested material does not end at establishment. Additionally virus survey work will be completed in order to update protocols performed by the program.

### **Layperson Summary of Project Accomplishments:**

Since the project’s initiation in October of 2016, efforts have been made by the above cooperators and the principal investigator to collaborate with farm advisors and industry related personnel across California. Meetings and presentations have been provided in order to notify the public of the potential for grower work group meetings in various parts of the state including the foothills, Bakersfield, Fresno, Paso Robles, Tulare, Lodi, San Diego and Davis, CA. Email notices have been delivered to specific industry leaders and farm advisors in order to begin scheduling work group meetings. Some meetings have been scheduled in order to discuss the logistics of how these meetings will occur and what type of surveys will be provided to growers. Additionally, requests for vineyard blocks which are to be sampled for red blotch and leafroll have made and contact with Joshua Kress has been established in order to analyze data provided by the certification program. Because the project recently began in October, there are no results to discuss at this time.

### **Status of Funds:**

Spending is appropriated to the project and on track with intentions of the grant. Remaining funds are sufficient for project continuation and completion.

**Status of Intellectual Property:**

There is no intellectual property associated to this project.

**Literature cited:**

- Al Rwahnih, M., Dave, A., Anderson, M.M., Rowhani, A., Uyemoto, J.K., Sudarshana, M.R., 2013. Association of a DNA virus with grapevines affected by red blotch disease in California. *Phytopathology* 103, 1069–1076.
- Bioletti, F.T., 1931. Unpublished notes, UC Davis Special Collection.
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- Golino, D.A., 1993. Potential interactions between rootstocks and grapevine latent viruses. *Am J Enol Viticult* 44, 148–152.
- Matthews, R., 2012. *Plant virology*. Elsevier.
- Wolpert, J., Walker, A., Weber, E., Bettiga, L., Smith, R., Verdegaal, P., 1994. Rootstocks and phylloxera: A status report for coastal and northern California. *Viticulture Notes* 6, 1–17.