

I. Project Title. Field evaluation of grape plants expressing potential protective DNA sequences effective against Pierce's Disease

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Collaborators

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III. OBJECTIVES

Prepare land area to receive the experimental plants with the following specifications:

- i. Area will be sufficient to accommodate up to 500 plants from Lindow, Gilchrist, Labavitch and Dandekar.
- ii. Row spacing is 15 feet between rows with 4 feet between plants. This spacing requires 18 rows of 28 plants each and includes a 50 foot open space around the planted area. Total area occupied by plants and buffer zones will be a minimum of 1.8 acres.
- iii. Each row will be staked with 7 foot grape stakes supporting 13 gauge wire in two wire trellis system with a stake at each plant site. Wires will be stretched and anchored by 7 foot pressure treated posts at the end of each row.
- iv. Area will be fenced to protect against rabbit invasion. The plants will be irrigated by surface furrow with several pre-plant irrigations to bring the soil to field capacity at the time of plant.
- v. Field crews will be provided from these funds to assist in planting.
- vi. Irrigation and pest management will be provided by Cooperator Kominek.

IV. Progress in meeting the objectives.

All of the above objectives set out for the establishment of this field planting were completed. Land preparation, fencing, irrigation, planting and weed control were all accomplished in a timely manner to meet the initial planting date of July 12, 2010 (Figure 1). Plans are in progress to complete the planting of the second phase of this project, also in a timely manner.

V. Publications: None

VI. Presentations. None

VII. Research relevance and conditions established by the APHIS permit.

The objective is to evaluate transgenic grape and grape rootstocks expressing various genes from different constructs in a field site in Solano County for resistance to *Xylella fastidiosa* (Pierce's Disease strain) following mechanical injections of *X. fastidiosa* into the plant stems. Over the course of the 3 year field evaluation, test plants in the first planting will include ungrafted conventional Thompson Seedless and Freedom plants as controls, transgenic plants from Dandekar, Labavitch, Lindow and Gilchrist projects and, as plant material availability permits with the first planting, transgenic rootstocks expressing some of the test genes grafted to untransformed PD susceptible scions. All plants will be shipped as vegetative material to the field area with no risk of pollen or seed dispersal and stored on site in lath houses until planted. The area is close to experimental grape plantings that have been infected with Pierce's Disease for the past two decades following mechanical inoculation in a disease nursery near this site. Over this period there has been no evidence of spread of the bacteria to uninfected susceptible grape plantings adjacent to the infected plants. In addition, there are 500 grape plants that were inoculated and infected with Pierce's Disease 6 years ago as part of ongoing disease research by another investigator and funded by the Pierce's Disease Research Board. The *X. fastidiosa* in this latter ongoing experiment has not spread to the uninoculated experimental controls within in the experiment or to any adjacent experimental grape plants over the past 6 years. Therefore, *X. fastidiosa* will be mechanically introduced in the test plants with a strain already reported in this field. The Solano County site has no incidence of natural Pierce's Disease infection or spread. The field planting will provide important data on the effectiveness of any of the transgenic strategies employed by the respective researchers.

VIII. LAYPERSON SUMMARY

The purpose of the field planting is to evaluate transgenic grape and grape rootstocks under natural field conditions for efficiency in providing protection against Pierce's Disease. The site in Solano County will enable controlled inoculation and close monitoring of the host response in terms of symptoms, bacterial behavior, and plant morphology. While no fruit will be produced, assessment of the growth characteristics of the plants, inoculated and non-inoculated will be made. Over the course of the 3 year field evaluation, test plants in the first planting will include ungrafted conventional Thompson Seedless and Freedom plants as controls, transgenic plants from Dandekar, Labavitch, Lindow and Gilchrist projects and, as plant material from the first planting becomes available, transgenic rootstocks expressing some of the test genes will be grafted to untransformed PD susceptible scions to assess potential for disease suppression in an untransformed scion from signals in the transformed rootstocks.

IX. Status of funds. We anticipate that all funds allocated for the establishment and maintenance of the field planting in the fiscal year 2010-2011 will be expended by June 30, 2011.

X. Intellectual property. None



Figure 1. These two images illustrate the field preparation, trellis and staking arrangement and a portion of the initial planting at the Solano County site.