

Title of Project: BIOLOGY AND ROLE OF TREEHOPPERS IN GRAPEVINE RED BLOTCH DISEASE

Principal Investigator:

Dr. Frank Zalom
Department of Entomology
and Nematology
University of California
Davis, CA 95616
fgzalom@ucdavis.edu

Co-investigator:

Dr. Mysore R. Sudarshana
USDA-ARS,
Dept. of Plant Pathology
University of California
Davis, CA 95616,
mrsudarshana@ucdavis.edu

Co-investigator:

Dr. Kent Daane
Environmental Science, Policy,
and Management
University of California
Berkeley, CA 94720
kdaane@ucanr.edu

Cooperator:

Ms. Lynn Wunderlich
Farm Advisor
UC Cooperative Extension.
Placerville, CA
lrwunderlich@ucanr.edu

Cooperator:

Ms. Rhonda Smith
Viticulture Farm Advisor
UC Cooperative Extension,
Sonoma County
rhsmith@ucanr.edu

Cooperator:

Dr. Monica Cooper
Viticulture Farm Advisor
UC Cooperative Extension
Napa County
mlycooper@ucanr.edu

Time Period of Grant: The time period of this grant was one year, July 2017-June 2018.

Objectives:

1. Monitor the population dynamics of 3CAH in vineyards and surrounding landscapes over the season.
2. Conduct GRBV transmission studies using treehoppers collected from vineyards with red blotch disease, and detect GRBV in the salivary glands of insects collected. Monitor field transmission by 3CAH.
3. Determine transmission efficiency of 3CAH to identify virus acquisition periods and persistence in the insect.
4. Evaluate the role of cover crops on the 3CAHs in vineyards.
5. Determine status of common weed and cover crops as feeding and reproductive hosts for 3CAH.

Background: Grapevine red blotch disease, which develops following infection by Grapevine red blotch virus (GRBV), can substantially impact grape quality, substantially reducing their value. However, the epidemiology of this disease is not well known. The results of this project are intended to better define the role of the three-cornered alfalfa hopper (3CAH), *Spissistilus festinus* Say, in the epidemiology of GRBV, and to examine the role of grapevines, cover crops, and non-crop vegetation in and around vineyards in sustaining 3CAH populations. Studies to determine possible transmission by other treehoppers found in vineyards where GRBV is spreading were initiated. This essential information will contribute to the management of red blotch disease by cultural methods such as reducing plant hosts favorable to sustaining vector populations or precise treatment timings based on treehopper biology in vineyards where nearby GRBV source are known to occur.

Highlights and Accomplishments:

- population dynamics of the three-cornered alfalfa hopper (3CAH), *Spissistilus festinus* Say in vineyards and surrounding landscapes was monitored in vineyards and along transects from vineyards to natural areas
- adult 3CAH were first found on vineyard groundcover in late February to early March

- first 3CAH nymphs were detected on vineyard groundcover in late May to early June
- 3CAH densities generally increase between June and August, and again in October and November
- densities on the yellow sticky traps and in sweep net samples were slightly elevated in natural habitats in early June, just prior to increases observed in the vine canopy at both the vineyard edge and interior
- one season of information on the relationship between 3CAH abundance on vineyard ground cover and number of grapevine girdles has been gathered
- while girdles were found earlier, petiole girdling became apparent in August, with a greater proportion of girdles located at the vineyard interior
- field transmission studies with 3CAH are being monitored
- transmission studies with another treehopper found in vineyards, *Tortistilus albidosparsus*, have been initiated
- feeding and reproductive status of various common weeds and cover crops found in vineyards has been determined experimentally for 3CAH
- Spanish clover, dandelion, birdsfoot trefoil, common groundsel, field bindweed, magnus peas, bell beans, blando brome, purple vetch, black medick, subterranean clover, crimson clover, and woollypod vetch were all found to be reproductive hosts
- buckhorn plantain, Kentucky bluegrass, wild carrot, mustard, oats, and Bermuda grass are poor feeding hosts, not reproductive hosts and likely would not be of significance for maintaining 3CAH populations in vineyards where more suitable hosts are present
- plants of the family Fabaceae were shown to be preferred hosts of 3CAH in a choice study
- even within the Fabaceae, reproductive preference was shown with the two vetch species tested being preferred over the two clover species tested