

Improving Management of Virginia Creeper Leafhopper in North Coast Vineyards

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Leafhoppers (*Cicadellidae*)

- Key species in vineyards
 1. Western Grape Leafhopper
 - Problem since 17th century
 2. Variegated Leafhopper
 - Arrived in the 1980s
 - S. California
 3. Virginia Creeper Leafhopper
 - Arrived in the 1980s
 - N. California



Leafhoppers (*Cicadellidae*)

- Piercing-Sucking insects
- Feed on leaf mesophyll
 - Reduces photosynthetic capacity
 - Leads to reduced yield, quality, and vigor
- Overwinter in leaf litter and weeds
- Feed and reproduce on grape leaves



Leafhoppers (*Cicadellidae*)

- 2-5 generations per year
- Natural enemies can be predators and parasitoids
- There have been increasing outbreaks of Virginia Creeper leafhoppers in the North Coast
- Many vineyards have more than one species; complicating management

Climate Change – Species Migration

- As climates change many species are moving to new regions and establishing populations there
- Even Coast Redwood ranges are expected to move north in the future
- True for most species



MIGRATIONS IN MOTION

As climate change alters habitats and disrupts ecosystems, where will animals move to survive? And will human development prevent them from getting there?



Climate Change – Species Monitoring

- Other factors besides geographic range may also change in wild species
 - Timing of developmental stages may change
 - Survivability or reproductive fitness
- Monitoring and recording these changes will be essential to agriculture and natural systems
 - Particularly important for agricultural pests



Climate Change – Species Control

- Chemical controls are a good option
 - Sometimes they work very well
 - Should be a last resort in most cases
- Biological control
 - Beneficial predators and parasitoids have performed well in controlling pests in the past
 - New species or methods for biological control will have to be introduced/developed to adapt to changing climates



UC Research Project

- University of California is conducting research to improve biological control of vineyard leafhoppers
- Virginia Creeper leafhopper is a primary target of control in the North Coast



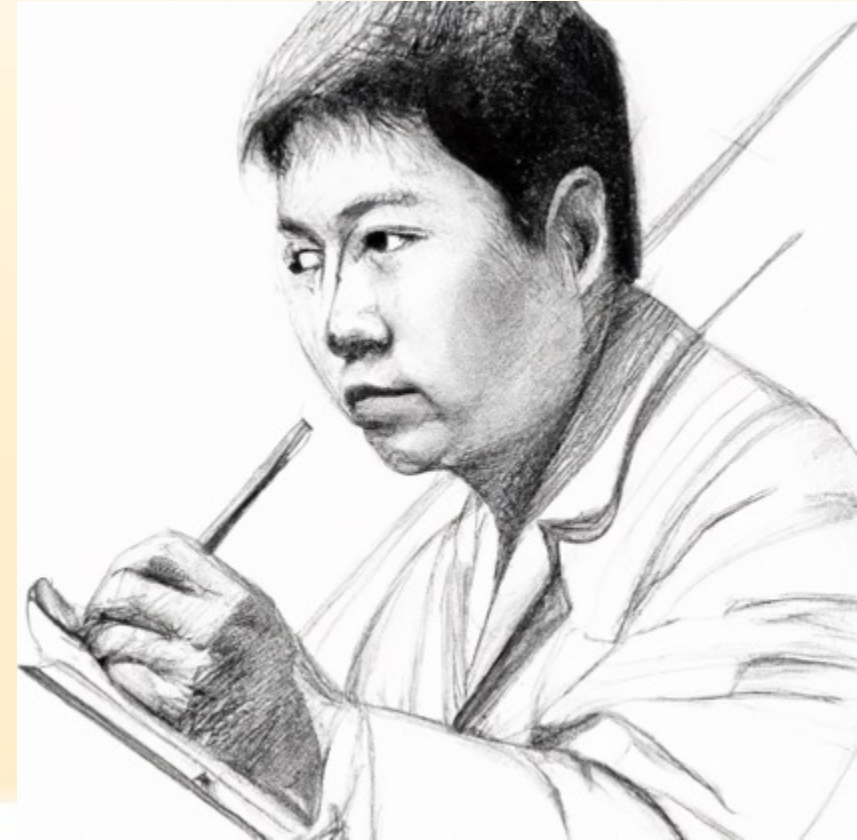
UC Research Project

- *Anagrus spp.* wasps are a main parasitoid of leafhoppers
- Novel strain of *Anagrus daanei*
 - Attacks Virginia Creeper leafhoppers
 - Was introduced to Mendocino and Lake from 2015-2017
 - Study was limited and did not continue after 2017
- UC continuation of this study



First Phase - Survey

- Regional survey of leafhopper populations and *Anagrus* spp. parasitoids needed
 - Surveying 20 vineyards across 4 counties
 1. Mendocino
 2. Lake
 3. Sonoma
 4. Napa
- Identification of parasitism in leafhopper eggs
 - Surveying sites in June and August/September
 - Parasitized eggs will be reared to allow wasps to grow



Second Phase – Novel Chemical Controls

- Leafhoppers typically controlled with
 - Imidacloprid (Admire Pro)
 - Buprofezin (Applaud)
- Organic or Biodynamic vineyards have different options
 - Pyrethrin (Pyganic)
 - Azadirachtin (DeBug Turbo)
 - Oils (JMS Stylet Oil)
- Organic options are often not as well tested



Second Phase – Novel Chemical Controls

- Field testing
 - UC will evaluate the efficacy of organic leafhopper products in a commercial vineyard setting
 1. Pyrethrin
 2. Azadirachtin (Azaguard)
 3. Thyme Oil (Proud3)
 4. *Beauveria bassiana*
 5. Colloidal oil (PureCrop1)
 6. Kaolin Clay (Surround)
 7. Insecticidal Soap (DesX, M-Pede)
 8. *Chromobacterium subtsugae* (Grandevo)
 9. *Burkholderia* spp strain A396 (Venerate)



Second Phase – Novel Chemical Controls

- Site monitoring
 - Monitored with yellow sticky-traps
 - Replaced every two weeks
 - Monitoring from May – September
 - Site in Mendocino County



Third Phase – Outreach and Education

- Share findings with our clientele
 - Best management practices derived from the study
 - Population dynamics found through surveys
- Regional grower/PCA meetings in North Coast
 - Present information on monitoring, biology, and BMP
 - Take suggestions for future focus of these projects
- Other topics to cover besides this project
 - Spring/summer ground cover management
 - Moderating vine vigor
 - Non-crop host plants as leafhopper and *Anagrus* refugia
 - Product selection and spray timing





Efficacy of Products

- Comparing the efficacy of both
 - Conventional
 - Organic products
- Data sourced in a commercial setting
 - More applicable to real-world scenarios
- Providing real answers to ‘How effective’ a product is at controlling leafhoppers

Visualize Leafhopper Distributions

- Survey data will be used to identify distributions of different leafhopper species which are pests in vineyards
- The spread, range, and concentrations of different leafhopper species may help to inform best management practices across the North Coast



Summary

- The three phases of this project are designed to identify leafhopper populations and how to best treat them
- Outreach and dissemination of results and BMPs is a major part of the project
- Community participation is also essential to achieving our goals



Thank You