

Award Category: IPM Team/Group Program/Project/Organization
European Grapevine Moth Team

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Nominee Name of Team/Group/Project: European Grapevine Moth Team
Nominee Main Contact for Group (if applicable) Lucia Varela
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Nominee Affiliation (if applicable):
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The Nominee is From
United States/Canada

Are you aware if the nominee has plans to present at the 2018 Symposium in Baltimore?
Not Sure

1. Provide a brief summary of the program's accomplishments (500 words or less)
In September 2009, European grapevine moth (EGVM) was detected in grapes in Napa County and confirmed by USDA on October 7, 2009. European grapevine moth larvae bore holes into grape berries directly damaging the fruit and allowing entry of fungal pathogens. In addition, presence of the European grapevine moth results in trade restrictions and economic loss. The Napa County detection was the first in the United States, triggering state and federal regulatory actions. In 2010, more than 100,000 European grapevine moths were identified in monitoring traps in Napa County and moths were trapped in nine other counties (Sonoma, Solano, Mendocino, San Joaquin, Merced, Fresno, Santa Cruz, Santa Clara, and Monterey). Given that the traps use sex pheromones to attract male moths, this number suggested a much greater total population than what was detected. The European grapevine moth team (the Team) worked to address research and extension needs of regulators and the grape industry to mount an eradication campaign. Since this was an invasive pest, the Team had to quickly assemble information from overseas and design a research program to address California-specific questions. Within 90 days of initial identification, an extensive literature review (from documents in French, Italian, Portuguese, Spanish and English) describing the current knowledge of life cycle and management was published on the UC IPM Exotic and Invasive Pests webpage. The Team mounted a multi-pronged program to study the biology and life cycle under California conditions, assisted and informed growers to monitor and control this pest, and addressed regulatory questions regarding detection and delimitation. The Team designed and conducted 15 trials to evaluate

winter mortality factors, validate monitoring tools, determine the host range, evaluate organic and conventional insecticides, and study larval mortality during the winemaking process. The results were used to develop extension recommendations on trap location and density, conventional and organic insecticide efficacy and timing, and handling of winery processing waste. Based on research results, USDA-APHIS reformulated their lures and increased trap density. Growers and pest management consultants used information on the three commercial pheromone lures to monitor vineyards. Growers used degree-day model information to appropriately time control measures in quarantined regions where populations were below detectable levels and pheromone-based monitoring was not effective. Based on host range research, another important crop, olives, were found to be a host. The Teams research determined that pesticide applications to olives could be limited to bloom time, thereby reducing total insecticide applications to olives. Grower adoption of the Teams management guidelines on insecticides and application timing resulted in no grape crop loss in 2010 and no secondary pest outbreaks from insecticides damaging native biological controls of other insect pests. In addition, organic growers were able to maintain their certification, while effectively managing insect populations. On August 18, 2016, USDA-APHIS declared European grapevine moth eradicated in California, and therefore the entire United States. This was an incredible victory. It eliminated the human-health, economic, and environmental impacts that would have accrued from continued management of this invasive pest.

2. Describe the goals of the program being nominated; addressing why the program was conducted and what condition does this activity address? (300 words or less):

The goal of this project was eradication of European grapevine moth, an invasive pest, in California using IPM methods. In September 2009, European grapevine moth was detected in grapes in Napa County and confirmed by USDA on October 7, 2009. European grapevine moth larvae bore holes into grape berries directly damaging the fruit but also allowing entry of fungal pathogens. In addition to this damage to the fruit, presence of the European grapevine moth results in trade restrictions and economic loss. The Napa County detection was the first in the United States and triggered state and federal regulatory actions. In 2010, more than 100,000 male European grapevine moths were identified in monitoring traps in Napa County and male moths were trapped in nine other counties (Sonoma, Solano, Mendocino, San Joaquin, Merced, Fresno, Santa Cruz, Santa Clara, and Monterey). Given that the traps use sex pheromones to attract male moths, this number suggested a much greater total population. The European grapevine moth team worked to address research and extension needs of regulators and the grape industry. Based on the research and education programs of the Team, by 2013 there were no European grapevine moths trapped in nine counties. The last European grapevine moth trapped in Napa County was in 2013. Lucia Varela, North Coast Area IPM Advisor, briefed a joint panel of the Congressional Invasive Species Caucus and the Congressional Wine Caucus on European grapevine moth in December 2015. On August

18, 2016, USDA Animal and Plant Health Inspection Service declared European grapevine moth eradicated in California, and therefore the entire United States. This was an incredible victory. It eliminated the human-health, economic, and environmental impacts that would have accrued from continued management of this invasive pest.

3. Describe the level of integration across pests, commodities, systems and/or disciplines that were involved. (250 words or less):

The European grapevine moth team successfully integrated the skills of each member to cover the research to extension education continuum. This integrated research to adoption program resulted in implementation of their recommendations by regulators and the grape industry. Since this was an invasive pest, the Team had to quickly assemble information from overseas and design a research program to address California-specific questions. By late 2009, an extensive literature review (from documents in French, Italian, Portuguese, Spanish and English) describing the current knowledge of life cycle and management was published on the UC IPM Exotic and Invasive Pests webpage (<http://ipm.ucanr.edu/EXOTIC/eurograpevinemoth.html>). Then the EGVM team mounted a multi-pronged research program to (1) study the biology and life cycle under California conditions, (2) assist and inform growers to monitor and control this pest, and (3) address regulatory questions regarding detection and delimitation to prevent the spread of this serious pest. The Team obtained funding through a Cooperative Agreement with USDA-Animal and Plant Health Inspection Service (USDA-APHIS) and through a grant from the California Department of Food and Agriculture. The Team designed and conducted 15 trials to evaluate winter mortality factors, validate monitoring tools, determine the host range, evaluate organic and conventional insecticides and study larval mortality during the winemaking process. The results of the research trials were used to develop extension recommendations on trap location, trap density, conventional and organic insecticide efficacy, insecticide timing, and handling of winery processing waste.

4. What outcome describes the greatest success of the program? (250 words or less)

Examples of successful eradication of widespread invasive pests are few. In 2010, nearly 110,000 male European grapevine moths were trapped in the north coast, central coast, and San Joaquin Valley of California. By 2015, quarantines were lifted for all locations except the northern portion of Napa County. On August 18, 2016, USDA Animal and Plant Health Inspection Service (USDA-APHIS) declared European grapevine moth eradicated in California, and therefore the entire United States. The greatest success of the European grapevine moth program was going from ten infested counties with large numbers of male moths trapped in Napa County in 2010 to eradication of the invasive pest in 2016.

5. Provide evidence of change in knowledge, behavior, or condition because of the program. (300 words or less)

Since European grapevine moth was an exotic introduction, no information was available about the pest under California conditions. The Team developed significant new knowledge through research. During a winter mortality study, they determined the pupae overwintering location on the vine, low mortality rate of pupae by natural enemies, and the ratio of females to males during the 6 weeks of adult emergence. During the grape season, they documented male moths fly at most only 50 meters towards a trap and validated degree-day models to predict the development of different life stages of European grapevine moth. They collaborated with USDA scientists to document that the only alternate host was olive flowers and only for the first generation of European grapevine moth each season. The Team examined the efficacy and optimal timing of conventional and organic insecticides. The results demonstrated that low-toxicity conventional and organic insecticides gave excellent control without disrupting the natural biological controls for other grapevine pests. Since winery processing waste (stems, skins etc.) and equipment used to harvest, transport and process infested loads of grapes could be a route for spreading the insect, the Team determined larval survival rates when infested grapes are processed during common winemaking practices for both white and red varieties. These experiments were used to develop three waste management recommendations and recommendations for equipment cleaning. The Team examined the genetic structure of population European grapevine moth populations from California, Chile, and Europe in order to identify likely pathways of introduction for regulators to focus on to prevent future introductions. Behavioral change is discussed in the next section under adoption. Condition change was the successful eradication of a widespread invasive pest in California thus eliminating all future negative human-health, environment, and economic impacts from EGVM.

6. Provide evidence of client adoption of IPM practices, improve economic benefits, or pesticide use reduction because of project implementation. (500 words or less)

The research conducted to increase knowledge of European grapevine moth in California was converted into practices adopted for control. Based on test results of monitoring tools, USDA-APHIS reformulated their lures and increased trap density. Growers and pest management consultants used information on the three commercial pheromone lures to trap vineyards. Growers used degree-day model information to appropriately time control measures in quarantined regions of California where populations were below detectable levels and therefore monitoring was not effective. Based on host range research, pesticide applications to olives were limited to bloom time, thereby reducing total insecticide applications to olives. Grower adoption of the Teams management guidelines on insecticides and application timing resulted in no crop loss in 2010 and no secondary pest outbreaks from insecticides damaging native biological controls of other insect pests. In addition, organic growers were able to maintain their certification, while effectively managing insect populations. Based on processing waste research, wineries composted grape waste on site, at an approved compost facility, or returned it to the vineyard of origin. Waste from grapes pressed to a

minimum of 2 bars (28 PSI) did not need to follow these guidelines. The quarantine zone shrank from 10 counties in 2011, to 2 counties in 2014, to eradication in 2016. The eradication declaration is based on zero trap finds for three generations of the insect as predicted by degree-day development models. Part of the economic benefit of eradication is the lifting of trade restrictions on fresh grapes by trading partners. Pesticide use for European grapevine moth was eliminated with the eradication of the insect.

7. Describe the team building process; how did the program being nominated get partners involved? Education and awareness are essential in an IPM program. (250 words or less)

Team efforts occurred under the pressure of significant export implications of pest introduction and within a high-value wine grape production region. The European grapevine moth team provided transparent and timely science-based communication to grape growers, state and federal regulators, and residents. This communication helped foster trust, respect, and cooperation among all parties involved. The Team used many methods to communicate to anyone directly or indirectly affected by the quarantine areas. Information generated from field observations and research trials was reported weekly or semiweekly through UCCE Napa County EGVM newsletter. The 930 subscribers include grape growers, winemakers, County Agricultural Commissioners and their technical staff, state and federal regulators, national and international colleagues, and the press. This information and photographs were used to train field crews and time control measures. The newsletter also provided current information on regulatory policy. This alert system supplied grape growers in all affected regions access to the most current detection, biology, management, and regulatory information. For grape growers and winery personnel, education materials included trifold brochures, a bilingual poster, and videos. Farmworkers, who may see European grapevine moth during their typical work, were reached through Spanish language presentations, field days, and outreach materials. Public awareness was raised through postcards, door-hangers, magnets, billboards public service announcements, internet sites, and social media. Team members presentations in 21 counties (Alameda, Amador, El Dorado, Fresno, Lake, Mendocino, Merced, Monterey, Napa, Nevada, Riverside, Sacramento, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus and Tulare) raised awareness.

8. Did this project utilize any innovative methods that could be shared with others? (Please explain in 200 words or less)

The European grapevine moth team maintained their status as an independent, science-based group committed to providing transparent information to both the regulatory community and the grape industry. Team members were cognizant of this role during all interactions and were careful to never appear to take sides. Because of this, the European grapevine moth team was trusted by all parties involved in the

eradication effort and maintained focus on basing all actions on science-based information.

9. Please share one article that represents the work of the team (No Vita's or Resumes) Our committee would prefer if you include a link to this article in the box; however, if that is not possible please, send this document via email to Janet Hurley at jahurley@ag.tamu.edu with the subject line "IPM Team/Group Award Category and nominee's name".

<http://calag.ucanr.edu/archive/?article=ca.v068n04p125>