

REPORT OF THE TECHNICAL WORKING GROUP
FOR THE
EUROPEAN GRAPEVINE MOTH PROGRAM
November 2, 2015

A subset of the Technical Working Group (TWG) for the European grapevine moth (*Lobesia botrana* [EGVM]) program in California met by teleconference on November 2, 2015. TWG members attending: M. Cooper, C. Ioriatti, D. Lance (TWG Chair), A. Lucchi, V. Mastro (USDA-Emeritus), G. Simmons, R. Steinhauer, R. Cardé and L. Varela. One member (B. Bagnoli) was not in attendance (Appendix III). Program personnel from federal, state, and county levels provided the TWG members in attendance with a summary of activities and results from the previous season. Following that, the TWG met separately to formulate responses to a series of questions from the program and draft recommendations on guidelines for deregulating areas as the program progresses. The format did not allow for a preliminary oral report to the program during the course of the meeting.

Overview

In previous reports, the TWG has provided recommendations on survey, control, and regulatory measures for the EGVM program. Those guidelines have largely been followed, and no moths have been caught within the remaining regulated area since 2013 despite an intensive trapping effort. The program to date has been a highly successful collaboration among government agencies on at least three levels (federal, state, county) and the growers, who bore the brunt of costs associated with control treatments and regulatory compliance. Recent TWG reports also included guidelines for removing areas from regulation; specifically, six full generations with no captures despite intensive (delimitation-level) survey. Barring additional captures, that criterion will be met after the second flight of 2016, allowing deregulation of all of portions of Napa and Sonoma counties that currently remain under quarantine.

Background

At its 2010 meeting, the TWG agreed that eradication of EGVM from California was technically feasible, given persistence of the following conditions:

1. The population is not (and does not become) substantially more widespread than it is known to be at present,
2. The grape industry remains behind the effort, and
3. Control methods that are available at the present time remain available for use by the program.

Since the discovery of EGVM in California, numbers of males captured in the core infested area have been reduced from over 100,000 moths in 2010, to 146 in 2011, 77 in 2012, 40 in 2013, and one in 2014. The 2014 find was in Sonoma County but outside of the area under regulation. No moths have been caught in outlying counties (outside of Napa and Sonoma) since 2011. Control efforts have consisted of an effective combination of insecticides and mating disruption treatments. Organic options have been used where applicable, and residential areas have been treated with *Bt* and/or fruit stripping as appropriate. These treatments have largely followed TWG recommendations and remain available and efficacious.

At this time, all previously infested areas of California beyond Napa County have been deregulated, with the exception of a portion of Sonoma County that is within 3 miles of earlier captures in Napa County. The TWG commends the efforts of the growers and recognizes that they have collectively borne the brunt of treatment costs and, along with growers of other affected crops, the burden of regulatory measures. Program officials at the federal, state, and county levels have continued their very good job of coordinating program activities and executing an effective survey program.

Mating disruption treatments ended in 2014, and the trapping grids of 2015 and 2016 should be fully functional and capable of detecting any residual populations. Of particular risk are small vineyards associated with residential gardens that may not be known to the program. This concern is the basis for continuing TWG recommendations to maintain a robust detection program with as many traps as resources permit. Continued vigilance is critical. Additionally, we recommend that program partners continue efforts to identify plantings of grapes that may have previously gone unsurveyed and untreated. Wineries that have had exchanges of grapes from core infested areas and movement of farm equipment from infested vineyards also remain priorities for survey.

Specific recommendations

Recommendations new, emphasized, or unique to this report:

Quality Assurance of Monitoring Program: As the program moves towards eradication, it will be important to ensure that the survey program is functioning properly and highly effective. The program should continue to emphasize quality assurance of the monitoring program:

1. Per recommendations in the CDFA Insect Trapping Guide, inspect all traps twice, using separate inspectors, before they are discarded.
2. Ensure that all trapping personnel are adequately trained to recognize suspect EGVM. This includes refreshers for veteran personnel, as the dearth of captures in past few years means that opportunities to see EGVM in traps have been rare recently.
3. Use laboratory reared moths (available from the USDA Otis Laboratory) to seed traps to test screening effectiveness and as a training aid.
4. Have program supervisors continue to accompany trappers in the field regularly to verify correct trapping procedures are being followed and trap placement is effective.
5. Conduct evaluations to ensure that pheromone lures have the correct component blend and quantity. Samples from all batches of lures should be tested prior to use. Samples may be taken again during the season if storage conditions are sub-optimal (e.g., room temperature or warmer). The USDA Otis Laboratory can perform the lure analysis.

Treatments: The TWG recognizes that there has been some ambiguity in earlier recommendations for insecticide treatments – specifically, do treatments need to be continued for the first two generations of each year from the time of detection until the area is deregulated, or for a specified number of generations after a capture? The current TWG recommendation is that hosts of EGVM that are within 500 m of a find should be treated with insecticide for six full generations following the most recent capture at that location (olive only being treated during the first generations annually). In residential areas, host removal (at minimum, removing all flowers

and fruit from grapevines) may be substituted for insecticide treatment. With that said, after some discussion, the TWG agreed that insecticide treatments should be considered optional throughout the program area in 2016, with the assumption that most growers will not apply insecticides unless other pest issues dictate treatment. Although this may result in some areas being treated for only 4 or 5 generations after the last find, no moths have been caught in the regulated area for over 2 years, and not treating will reduce the burden on growers while increasing the chances of locating any residual population(s) of EGVM.

Development of a Post Eradication Plan: The TWG strongly supports the ongoing effort to develop a comprehensive post eradication plan that will ensure continued vigilance against EGVM and that appropriate procedures will be followed in case of another introduction. A small working group composed of a subset of TWG members, treatment coordinators, UC scientists, and key program personnel have developed a draft post eradication surveillance and response plan. The TWG expects to review document during the winter of 2016 so that a finalized plan could be in place well ahead of any declaration of eradication. This plan should include, at a minimum, strategies and time-lines for phasing down trapping levels in the wake of eradication, guidelines for developing protocols for long-term detection trapping of EGVM and other invasive grape pests both within and beyond California, regulatory and outreach/education measures aimed at minimizing chances of re-introduction, response guidelines in the case of another introduction (delimitation, treatment, regulatory), and response triggers (these are available but may be reviewed). Note that proposed responses may differ somewhat from those used in the current eradication effort given that an ongoing detection program would presumably find the pest population when it was much smaller than the 2010 EGVM infestation.

Mating disruption (MD) treatments: The TWG is specifically recommending against MD treatments in 2016. This will help ensure that the ongoing trapping effort is effective. An exception would be if EGVM was detected in the regulated area during the first flight of the 2016 season, in which case MD should be considered per *Treatment recommendations 2* (below). In addition, if there is one (or possibly a few) single, isolated capture, the program may consider, in lieu of MD, high density trapping (e.g., 250 traps per square mile) around the find(s) to confirm the presence of a breeding population. Note that the TWG is not suggesting that this trap density is sufficient to act as a control (mass-trapping) treatment.

Deregulation of the remaining areas still under regulation. Given that no moths were captured within the regulated portions of Napa and Sonoma Counties in 2014 or 2015, the entire area will be eligible for deregulation after the second flight of 2016 if trapping protocols are followed and no EGVM are captured. The projected date for completion of the second flight is, conservatively, August 15, 2016. See *Deregulation*, below, for additional details.

Trapping outside of the regulated area: The TWG is reiterating an earlier recommendation of 25 traps per square mile for all grape production areas in California, at least until all of Napa County is deregulated. Maintaining the relatively high density (25 per square mile) is especially critical for Sonoma and Solano Counties given the levels of agricultural materials and equipment that move back and forth from Napa and histories of finds in those areas. Traps should be placed in the immediate vicinity of all wineries or other facilities that receive materials or equipment from within regulated areas.

For areas removed from quarantine in the previously infested contiguous core area of Napa and Sonoma counties (all infested areas before the deregulation action on 8/27/2014), we recommend

a minimum of 25 traps per square mile be deployed in all areas that contain grapes, including urban areas. Also, if trapping can continue in Napa County in previously-regulated grape production areas at 100 traps per square mile (as was done in 2015), that would be preferable.

General recommendations (with minor modifications from earlier TWG reports)

Quarantine trigger and buffer:

Areas not regulated for EGVM (including areas that have been released from earlier EGVM quarantine). Quarantine would be implemented if 2 moths are trapped within 3 miles of each other, within a lifecycle, or, if any immature stage is found. The regulated area would be a 3-mile buffer around the site (s) of any EGVM find(s), whether in a trap or on a host plant or commodity.

Areas currently regulated for EGVM. The TWG is recommending a programmatic trigger of one life-stage (adult in trap or immature). Finding a single insect will kick off a program response for trapping and control activities, and will reset the deregulation “clock” for areas within 3 miles of the find. The rationale is that populations have been driven low enough that transport of single moths to points outside of infested areas will be rare, so a moth find is likely an indication of local breeding population.

Survey recommendations (unregulated areas):

The TWG’s recommendations for survey in unregulated areas have changed little from those developed during the November 2010 meeting. Trapping recommendations for the Napa area are discussed separately in Deregulation and Post-deregulation, below.

1. Survey levels

- a. California grape production areas should target 25 traps per square mile for the entire trapping season (Feb 15 to Oct 1).
- b. Priority should be given to previously regulated areas and to vineyards in counties adjacent to Napa County.
- c. Priority should also be given to trapping the areas within 300 m of grape processing facilities (e.g., wineries), and especially those that have received grapes from regulated areas or have used processing or in-field equipment from regulated areas, including South America. These locations should be trapped intensively, preferably at 100 traps per square mile. In addition, any vineyards within that area, no matter how small, should have at least one trap. The TWG recognizes that factors such as budget shortfalls can potentially make it impossible for the program to meet recommended or protocol trapping levels in some areas. The history of EGVM in California indicates that most finds of the moth in remote counties has occurred in the vicinity of wineries, which is why these areas are priorities for survey. However, there have been additional EGVM finds in vineyards that were remote from wineries so all grape production areas should be trapped if possible.
- d. Delimitation surveys: 100 traps per square mile within 1 mile of new finds for two full generations.
- e. At-risk urban areas in California (outside of the previously infested core areas of Napa and Sonoma Counties) should be surveyed at a minimum of 5 traps per square mile.

These include areas near grape production areas or areas with backyard grapes. “Near” would be a minimum of 500 m but could increase to 1 to 3 miles with risk factors such as high proportions of yards with vines or proximity to current or previous EGVM infestations. This trapping can be combined with other trapping programs where applicable.

- f. For areas removed from quarantine in the previously infested contiguous core area of Napa and Sonoma counties (all infested areas before the deregulation action on 8/27/2014), we recommend a minimum of 25 traps per sq. mile be deployed in all areas including urban areas; in formerly regulated grape production areas, 100 traps per square mile is preferable (this level was largely met in Napa County in 2015).
- g. The TWG strongly supports current APHIS efforts to survey nationwide for EGVM.

2. Timing of trapping

Trapping should commence in the late winter or spring before the predicted start of the adult flight season. Traps should be in place before bud break, using degree-day modeling (at ~150 DD Celsius, 10-30 deg. base, with January 1 as the starting point for accumulating DD) as a guideline. This typically means getting traps out between February 15 and March 1, with priority given to varieties with earlier bud break. Continue trapping until October 1. Diapause in EGVM occurs in the pupal stage and is controlled primarily by photoperiod, so weather has relatively little influence on the calendar date when the flight season ends.

3. Trap placement

Traps that are placed at a specified density (i.e., a prescribed number of traps per square mile) should be spaced as uniformly as possible throughout the area being trapped. For example, if 100 traps per square mile are arrayed on a “perfect” square grid, traps will be 161 m apart, and maximum distance between an insect and the nearest trap within that area (mid-point on the diagonal between traps) will be 114 m (note that, at 25 traps per square mile, these distances would be doubled). To keep the maximum insect-to-trap distance reasonably close to 114 m, traps need to be placed within and not just at the perimeter of any vineyards that exceed ≈175 m across in the shorter dimension (length or width). See Appendix I of the 2012 TWG Report for details and the rationale for this recommendation.

Within vineyards, place traps at canopy height.

4. Lure loading

Based on results of testing in Portugal and Italy, either a 1-mg or 10-mg loading is appropriate for general detection and delimitation trapping. A 10-mg loading should be used in any traps placed in areas with active mating disruption treatments. The TWG is not recommending a change in the composition of the attractant at this time.

5. Visual inspections

The TWG recommends the use of visual inspections of grapes for immature EGVM, especially in areas under mating disruption treatment. These should be conducted during first generation of the year [note: given there was no use of mating disruption in 2015, visual inspections are not needed in 2016; recommendation holds pending possible future finds]:

- Inspect 100 clusters at 25 trap sites per square mile in treated areas.

- Inspections should be made during the period from the beginning of flowering to fruit set.
- Inspections would be expected to require 15-20 minutes per 100 clusters.

6. Other considerations

- a. Trap-check frequency. The TWG continues to recommend a 2-wk trap-servicing interval. Degradation of captured moths could occur during longer intervals, leading to misidentification or non-identification.
- b. Second-generation diapause. In areas of California, including the Napa Valley, a portion of the population will go into diapause following the second annual generation (i.e., they overwinter as pupae rather than emerging as adults as part of the third flight). This has also been observed in other areas where EGVM occurs. Second-generation diapause can affect our ability to detect the population via trapping during the third flight. It can also affect calculations of the overall number of generations a population passes through.
- c. The TWG was asked if, in outlying areas, stopping trapping after the second flight could potentially be used as a cost-saving strategy. This is not recommended but is preferable to reducing trap density.

Treatment recommendations:

Options for control treatments remain similar to those in previous recommendations.

1. Chemical treatments

- a. Treat to a 500-m radius around any 2016 finds (trap or larval).
- b. Barring additional EGVM finds, insecticide treatments in 2016 are optional. In an ongoing program, first and second yearly generations should be treated for a minimum of six complete flights after the most recent detection in an area. As noted above, an exception will be parts of Napa County with only 4-5 applications if the no-treatment option is chosen in 2016. The TWG does not recommend attempting to treat the third-generation larvae or overwintering EGVM.
- c. Time treatments based on degree-day (DD) models and (primarily) host phenology (first annual generation) and primarily DD models (second generation). For the first generation, along with keeping track of DD, grapevine phenology should be monitored; the first annual generation should be treated once the flower cluster is fully expanded, just prior to the initiation of bloom. This was determined based on sampling conducted in Napa County in 2010 and 2011.
- d. The current list of available insecticides remains appropriate. Methoxyfenozide (“Intrepid”) and Chlorantraniliprole (“Altacor”) have been the most commonly used options and have been very effective, but growers (or program managers) should continue to select products based on situation and need. For organic production, Bt and spinosads (“Entrust”) are the available options. These insecticides have a short field residual and can require multiple applications per generation to be effective.

2. Mating disruption

- a. Treat to a 500-m radius around sites of any 2016 finds in the Napa area, if (and only if) those finds occur during the first flight (trap) or first generation (larvae). If EGVM captures indicate the presence of a population at a remote location beyond the Napa infestation, use of mating disruption is at the discretion of the program based on a variety of factors, including the apparent size of the population and the efficacy of the other control measures being used.
- b. Do not apply to areas surrounding 2010, 2011, 2012, or 2013 finds, unless those areas are also within 500 m of a 2016 find.
- c. Efficacy of mating disruption may decrease at the edges of treated areas, and this effect is most pronounced along windward edges. Applying dispensers to vegetation surrounding vineyards, where feasible, can help alleviate this effect.
- d. When mating disruption is used in residential areas, cover the area surrounding the find(s) as uniformly as possible out to 500 m.

3. Residential, urban, and natural areas.

Continue to use host removal or Bt, in combination with mating disruption, when practical.

Alternate and secondary hosts

The TWG does not have recommendations in this area at this time, other than to continue treating flowering olives as potential hosts. Applicable recommendations on EGVM host plants can be found in previous TWG reports and in several communications that came out following the 2011 TWG meeting.

Regulatory Requirements

At this time, the TWG believes that the current regulatory requirements are sufficient and is not recommending any changes in regulation involving, for example, handling of winery waste, movement of grapes or grape plants, systems approaches to fresh grape certification, or handling of other grape products such as must. Some regulatory measures such as the requirement for slack-loading were relaxed in 2013 (following consultation with scientific support staff) based on reduced EGVM populations in the Napa area.

The TWG remains concerned about the risk of EGVM being imported on farm equipment from EGVM infested countries, and suggests that the program work with the wine and table grape industries to ensure that such risk is mitigated to the degree possible.

Deregulation

As noted in earlier reports, the TWG is recommending more stringent protocols prior to release from regulation for the Napa-Sonoma core infested area than were used for the outlying counties, all of which have now been deregulated with the exception of a portions of Sonoma that were within 3 miles of a Napa find in 2013. To reiterate, these conditions are:

1. Areas within three miles of previous EGVM finds in Napa County should continue to be regulated (no change) at this time, with the exception of areas deregulated in the summer of 2014. This continues to include a portion of Sonoma County.

2. General detection trapping within the entire regulated area should be maintained at 100 traps per square mile for grape production areas and a minimum of 25 traps per square mile in urban areas and other non-production areas where grapes may exist (an exception would be abandoned orchards, which should be treated as production areas if not turned under).

Extra care is warranted for urban and suburban areas in the last season prior to deregulation to ensure that isolated populations aren't escaping detection. This could include intensified efforts to locate, treat, and monitor small grape plantings as well as increased trap density in areas known to have grapes or otherwise be at high risk. In 2014, the TWG recommended trapping urban portions of the regulated area at up to 100 traps per square mile, and this remains as a preferred option if at all practical.

3. Treatments should be applied per recommended guidelines.

The TWG continues to recommend that areas can be deregulated if the above guidelines were followed and there were no additional finds in the area after four full flights with high-density trapping (and at least six full flights since the most recent find). Presence of active mating disruption dispensers within the area would not be allowed in the area during the last four full generations of high-density trapping. At present, we have four full generations with no captures throughout the entire regulated area, with specified conditions of high-density trapping levels and lack mating disruption having been met during two full generations in 2015.

If trapping recommendations are followed in 2016 and no additional captures occur (and no mating disruption treatments are applied), the entire remaining regulated area will be eligible for deregulation after the second full flight of the season. Target date for this deregulation would be August 15.

Alternately, if EGVM is detected in the regulated area in 2016, the regulatory and programmatic "clocks" would be reset for areas within 3 miles of any detection. More specifically, at that point the program should follow procedures outlined in 2014 and earlier TWG reports, as well as elsewhere in this document, regarding regulatory, trapping, and treatment activities. Areas beyond the 3-mile zone could still potentially be deregulated at the discretion of the program and depending on the number and distribution of captured moths.

Since the beginning of the program, the TWG has maintained that deregulation of Napa County should be done in large, contiguous blocks, preferably from the outside in, rather than in a patchwork fashion. Patterns of possible future finds are impossible to predict, but the TWG remains willing to provide recommendations in this area if and when they are needed to supplement Napa's deregulation protocols.

Appendix I Research needs from 2014 report unprioritized (annotated with updates)

- Determine the utility of high-load pheromone lures, light traps, food-lure traps, etc., for monitoring EGVM populations in areas under mating disruption treatments. As discussed above, studies on high-load pheromone lures in Italy and Portugal over the past two years have resulted in a recommendation of 10X lure loading for monitoring under mating disruption. Testing of additional lure components is also underway. Continued research on detection strategies for mating disrupted fields is recommended at least for one more season.
- Validate the degree-day model. A degree-day model has been developed and validated. It is being used along with grapevine phenology to time insecticide treatments for control of the first and second generation.
- Evaluate genetic diversity in EGVM. Research using microsatellite DNA to identify unique markers has shown that populations of Chile and US are genetically very similar, suggesting that (1) the same population from Europe was introduced twice to the Americas, or (2) the U.S. population was introduced from Chile, or (3) the Chile population was introduced from the U.S. The nearest European populations to those from the Americas are from Spain and/or France.
- Develop a spread model. Studying population dynamics is not possible in California due to absence of the pest. A GIS spatial analysis and modelling effort began in 2015 to analyze program trap data and will be used to assess the role of pathways, spread patterns and, control activities on invasion and population dynamics.

Control and management:

- Develop enhanced systems for monitoring and evaluating an area-wide EGVM management program.
 - a. Use GIS/GPS to track monitoring, treatment, and related relevant programmatic data. Ongoing, APHIS-PPQ.
 - b. Enhance tracking and evaluation of insecticide treatment data for Napa and Sonoma program areas. Ongoing, UC Extension.
 - c. Develop enhanced geospatial tracking and analysis of EGVM spread, control, and program activities in California. A GIS spatial analysis and modeling effort will begin in 2015 to analyze program trap data and will be used to assess the role of pathways, spread patterns and, control activities on invasion and population dynamics.
- Develop/assess new mating disruption formulations for EGVM, including machine- applied. Field trials were conducted in Europe (Italy, Portugal) in 2012-2014; results were presented during the TWG meetings. It is proposed to continue testing 5 component lure and new female attractant in 2016.
- Determine field life of mating disruption dispensers and how that affects the efficiency of pheromone-based trapping systems over time. This was a new item for the 2012 report; there is some concern that if dispensers are left in vineyards, they could affect detection sensitivity the following year. Various types of mating disruption dispensers from the 2012 study in Italy were analyzed for attractant residue across time; results are being published.

Develop Sterile Insect Technique methodology for EGVM:

- Improved rearing technology. This work is ongoing and has resulted in identification of a suitable diet as well as substantially improved holding and handling methodology.
- Radiation biology – identify dose and methods for producing fully sterile and F1-sterile male EGVM. This work has been ongoing at the Otis lab initial characterization is complete, and age/dose schedules have been developed for pupal irradiation, though a bit of basic competitiveness testing is still needed. Work on radiation as a phytosanitary treatment for EGVM is also underway.
- Develop release technology and evaluate field competitiveness of sterile moths. We are not yet at the point where this is feasible. Workers in Israel have developed some of the components needed to develop SIT technology for EGVM and a new methods development laboratory has started work in Chile to develop SIT for EGVM. As USDA cooperates closely with these countries, information from these projects will be available should SIT be needed at a future date.

Regulatory:

- Develop and/or confirm regulatory treatments for grapes (table, wine, and raisin). This work has been completed.
- Develop regulatory treatments for grape nursery stock; confirm efficacy of hot-water dip. As the EGVM population has declined to extremely low levels this work has become less urgent.
- Investigate pathways that could move EGMV to new areas. Also, how did it get to Napa? This goal will be part of planned GIS spatial analysis and will be used to assess the role of pathways on invasion dynamics.
- Evaluate/develop improved methods of transporting grapes within California to reduce incidence of new EGVM finds in the vicinity of wineries that are outside of regulated areas. As the EGVM population has declined to extremely low levels this work has become less urgent.

Appendix II, Questions from EGVM Program with responses from the TWG

From CDFA

Q: Based on what has been learned/achieved - What lifecycle model should be used for the current of future EGVM programs in California? (Note: the TWG followed up with this and determined that this is a question about timing program activities such as trapping and treatments.)

A: For setting out traps, the TWG recommends traps should be out after 150 DD (°C) have been accumulated which will be before bud break in most areas. As a practical matter, getting traps out between 15-February and March 1 will meet these criteria based on recent weather data.

For treatments, the TWG recommends using timing based on DD models and host phenology (first annual generation) and primarily DD models (second generation). For the first flight, grapevine phenology should be monitored; the first annual generation should be treated once the flower cluster is fully expanded, just prior to the initiation of bloom. This was determined based on sampling conducted in Napa County in 2010 and 2011. For second flight treatments we recommend using DD models to plan treatments.

See the guidance developed by the University of California:

Treatment timing for 2nd generation *Lobesia botrana* in California:

- Products with ovicide and larvicide activity (Intrepid and Altacor) should be applied after we have reached 780 DD (°C; from January 1).
- Products with larvicidal activity only should be applied after we have accumulated 860 DD (from January 1). Growers using organic products should expect to make 2 applications during the 2nd generation, at a 7-day interval.

Calculations used to determine treatment timing for 2nd generation *Lobesia botrana*: Lower and upper development thresholds are 10°C (50°F) and 30°C (86°F), respectively. Start date for degree day accumulations: January 1.

Heat unit accumulations from the literature (for the 1st and 2nd generations): 170 DD (°C) = egg hatch to pupation; 130 DD = pupa development to adult; 28 DD = delay between male and female emergence (for 2nd generation); 61 DD = time for female to mate and lay eggs

In 2012, we recorded our 1st larva of the 1st generation at 371 DD (°C): $371 + 170 = 541$ DD (when we expect to find the 1st pupae of the 1st generation); 541 (1st pupa) + 130 (pupa develop) + 28 (female emergence) + 61 (mate & eggs) = 760 DD is the earliest an egg of the 2nd generation might appear. Note that catching the 1st moth of the 2nd flight may modify this prediction.

Attempts to predict timing of life-history events for EGVM based on DD beyond January 1 may not always be reliable, especially if the intervening winter period is unusually warm. In those cases, may be best timed using a set number of DD after the first treatment rather than January 1. UC personnel should be consulted annually for advice on timing activities.

Appendix III, Participating Members of the Animal & Plant Health Inspection Service (APHIS) European Grapevine Moth (EGVM) Technical Working Group (TWG)

Dr. David Lance (Chair), Laboratory Director, USDA-APHIS-PPQ-S&T, CPHST Otis Lab, 1398 W Truck Rd, Buzzards Bay, MA 02542

Mr. Vic Mastro, (Emeritus) USDA-APHIS-PPQ-S&T, CPHST Otis Lab, 1398 W Truck Rd, Buzzards Bay, MA 02542

Dr. Gregory Simmons, USDA-APHIS-PPQ-S&T, CPHST California Station, 1636 E. Alisal Street, Salinas, CA 93905

Dr. Bruno Bagnoli, Department for Innovation in Biological, Agro-food and Forest systems, University of Tuscia, Viterbo, Italy

Dr. Claudio Ioriatti, Fondazione Edmund Mach, Technology Transfer Center, Via E. Mach, 1 38010 S. Michele all'Adige (TN) - Italy

Dr. Andrea Lucchi, Department of Agriculture, Food & Environment, University of Pisa, via del Borghetto 80 – 56124 PISA, Italy

Mr. Robert Steinhauer, Wineland Consulting, LLC, 1308 Main Street, Suite 112, St. Helena, CA 94574

Dr. Monica Cooper, Farm Advisor-Viticulture, University of California Cooperative Extension, 1710 Soscol Avenue, Suite 4, Napa, CA 94559-1315

Dr. Lucia Varela, North Coast IPM Advisor, University of California Cooperative Extension, 133 Aviation Boulevard, Suite 109, Santa Rosa, CA 95403-2894

Dr. Ring Cardé, Distinguished Professor and A.M. Boyce Chair, Department of Entomology, University of California, Riverside, CA 92521

Additional original member: Dr. Luis Sazo R., Department of Plant Protection, Faculty of Agricultural Sciences University of Chile, Santiago, Chile