European Grapevine Moth Post-Eradication Response Guidelines

Prepared by the European Grapevine Moth Post-Eradication Response Work Group
June 2016

EXECUTIVE SUMMARY

After the detection of the European grapevine moth (EGVM) in California in 2009, an intensive area-wide eradication campaign was conducted in cooperation with the grape industry, growers, County Agricultural Commissioners, University of California Cooperative Extension, the California Department of Food and Agriculture, and the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS). These efforts resulted in a significant decline in moth captures from over 100,000 moths in 2010, to one in all of 2014, and none in 2015. All previously infested counties have been deregulated through 2015 except for one area of Napa County and a border region with Sonoma County. Assuming there are no new detections in 2016, this pest will be declared eradicated after the second EGVM flight of 2016.

The purpose of these guidelines is to provide recommendations to the grape industry and program managers for post-eradication monitoring for all previously infested areas in California and in the event of a reintroduction, a treatment action plan. The guidelines also provide information to program managers on resources that may be required to maintain a post eradication phase for a period of time after EGVM eradication is declared.

While the program can move forward with confidence that eradication has been achieved, the conditions regarding possible entry pathways remain the same and it is important for the grape industry along with the state, county, and Federal cooperators to remain vigilant. Besides California, there are several other grape producing states where it will be prudent to conduct ongoing monitoring for EGVM and other economic grape pests.

The recommended guidelines do not propose continued regulation but instead are optional standards for monitoring after eradication is declared. The adoption of these guidelines are dependent upon decision-making by agricultural officials in each local grape growing region in cooperation with the affected industry. Continued outreach and education will be vital.

Our primary recommendation is to continue a post eradication phase for three years after eradication is declared. A second recommendation is to conduct an economic analysis on the cost and benefits of continued monitoring for EGVM after the post eradication phase program time period has ended, and to include in the analysis other potentially damaging economic grape pests not yet present in the US, California, or other western grape producing states.

While it is costly to monitor a large grape producing area of California, the cost of missing an early detection of a new grape pest is much larger in comparison if the first detection occurs after significant spread has occurred. Given the value of the grape industry at more than $4B in California alone, and the high cost of the eradication program for EGVM at over $100M, maintaining a robust and sensitive detection trapping program for EGVM and other invasive grape pests, is a value proposition. An economic analysis could help federal, state and industry authorities determine the value of such a program.

BACKGROUND

In the fall of 2009, the first confirmed North American detection of the European grapevine moth (EGVM), *Lobesia botrana*, was made in Napa County, California. Based on its status as a significant grape pest in other parts of the world, the establishment of EGVM in California presented significant production and export issues for grapes, as well as for other fresh market agricultural commodities.

Over the past seven years, an intensive statewide survey and area-wide eradication campaign was undertaken in partnership with the grape industry, growers, County Agricultural Commissioners, University of California Cooperative Extension, the California Department of Food and Agriculture (CDFA), and the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS). These efforts resulted in a dramatic decline in moth captures of over 100,000 moths in 2010, to one moth in all of 2014, and no moths in 2015. All previously infested counties have been deregulated through 2015 except for one area of Napa County and a border region with Sonoma County. Assuming there are no new detections in 2016, this pest will be declared eradicated from California after the second EGVM flight of 2016. At that time, the United States would be declared free from this pest.

As the eradication of European Grapevine Moth moves toward completion, plans for post-eradication program activities must be addressed. While the program can move forward with confidence that eradication has been achieved, the conditions regarding international trade and possible entry pathways remain the same. EGVM has expanded its pest range and is now present in parts of South America, which means there are additional possible invasion sources beyond European and Mediterranean countries. Taken together, it is important for the grape industry along with the state, county, and Federal officials to remain vigilant against EGVM. Besides California, there are several other grape producing states where it will be prudent to conduct ongoing monitoring for EGVM and other economic grape pests.

The purpose of these guidelines is to provide recommendations to the grape industry and EGVM program managers for post-eradication monitoring for all previously infested areas in California and in the event of a reintroduction, a treatment action plan. The guidelines also provide information to program managers on resources that may be required to maintain a post eradication phase for a period of time after EGVM eradication is declared.

These guidelines do not propose continued regulation or changes to the regulatory program; rather, the recommendations are optional and provide for a standard for monitoring after eradication is declared. The adoption of these guidelines are dependent upon decision-making by agricultural officials in each local grape growing region in cooperation with the affected industry. Continued outreach and education is necessary and vital to discourage introduction of exotic pests and is included as a recommendation.

The main objectives of these guidelines:

1) Document and define the program operations that were used to determine EGVM eradication.
2) Define post eradication surveillance trapping levels in the core of the previously infested area of Napa-Sonoma and other areas deemed at high risk.
3) Define treatment strategy and actions in the event of a detection of any EGVM life stage.

4) Define the time period to operate the post eradication phase.
5) Provide recommendations for an outreach plan for the post eradication phase.
6) Define the resources needed to operate a post eradication program.

RECOMMENDATIONS

Our primary recommendation is to continue a post eradication phase for three years after eradication is declared. A second recommendation is to conduct an economic analysis on the cost and benefits of continued monitoring for EGVM after the post eradication phase program time period has ended, and to include in the analysis other potentially damaging economic grape pests not yet present in the US, California, or other western grape producing states, such as the European grape berry moth (*Eupoecilia ambiguella*) grape tortrix (*Argyrotaenia ljungiana),* grape berry moth (*Paralobesia viteana),* honeydew moth (*Cryptoblabes gnidiella*)**,** and others. Lastly, there should be ongoing outreach to growers, field workers, trappers, and pest control advisors to ensure that they will continue to recognize EGVM and ongoing training for personnel involved in EGVM and other grape pest surveys.

While the cost of monitoring a large grape producing state such as California is extensive, the cost of missing an early detection of a new grape pest is likely much larger in comparison if the first detection occurs after significant spread has occurred. Given the value of the grape industry at more than $4 billion in California alone, and the high cost of the eradication program for EGVM at over $100 million, maintaining a robust and sensitive detection trapping program for EGVM and other invasive grape pests, is likely to be a value proposition. An economic analysis could help federal, state and industry authorities determine the value of such a program.

I. CONDITIONS AND ACTIVITIES USED TO DECLARE ERADICATION

Eradication status obtained through treatments (insecticides, mating disruption, and host removal), surveys, and high density trapping (See Appendix I Program Response for an EGVM Find). Declaration that the previously core infestation area in Napa and Sonoma counties is free from EGVM is obtained when an area with previous EGVM detection has completed six full generations with no evidence of a population. In areas outside of this core infestation area, the standard could be four full generations. In Northern California, the third flight of the year typically includes only a portion of the population and is not counted in the flight tally for confirmatory trapping prior to deregulation.

Quarantine Trigger/Buffer

After deregulation, the quarantine response would remain the same as the current program standard: a quarantine would be implemented if a total of two or more adult EGVM are trapped within three miles of each other and within the timeframe of one lifecycle as determined by degree day model; or if any mated female or immature stage is found. The regulated area would be a three mile buffer around the site(s) of any EGVM find(s), whether a trap capture or a find of a life stage on a host plant or commodity. *For finds in previously affected areas of Napa and Sonoma counties, chemical treatments will be initiated on a single moth, larva, egg or pupa find, regardless of whether the trigger for establishment of a quarantine is met or not.*

II. TRAP DEPLOYMENT AND DENSITIES

Monitoring should continue into the post eradication phase using pheromone-baited traps. Program managers may, at any time, adopt trapping protocols that are more rigorous than the recommended minimums.

1. Detection trapping:
   a. Trap deployment/Lures:
      i. Traps should be placed out before bud break of the earliest grape varieties or based on degree-day modeling (at ~150 DD Celsius, 10-30 degree base, with January 1 as the starting point for accumulating DD) and kept in place through three flights until October 1. As a practical matter in Northern California, all traps should be out by March 15.
      ii. Traps should be spaced as uniformly as possible throughout the area being trapped. Place traps at canopy height within vineyards.
      iii. Traps should be serviced every two weeks.
      iv. Lure loading is recommended at 1 mg, and lures should be changed every four weeks.
   b. Detection Trapping, Commercial Areas:
      i. Detection traps should be placed within all grape-producing areas of the state. Local officials should make risk level assessments of all areas to monitor based on local knowledge to provide an additional measure of security, as well as program officials considering trade issues.
         a. **Higher risk areas include:** previously infested areas in Napa, Sonoma, Mendocino and Solano counties; commercial areas that have extensive farming operations in other counties or distant fields and move or share equipment between farms; commercial vineyards that have international operations in infested countries and move or share equipment between them; production vineyards near backyard grapes in previously infested areas.
         b. **Medium risk includes:** commercial fields near wineries that receive fruit from previously infested counties; areas along major transport corridors; counties that receive fruit from contiguous core areas of Napa and Sonoma counties; other counties that had infestations; fields near grape distribution centers.
      ii. **For High Risk areas**: Use 25 traps/square mile *plus additional discretionary* trapping at the county level as determined by local County Agricultural Commissioner.
      iii. **For all other areas**: Use 25 traps/square mile.
   c. Detection Trapping, Urban Areas:
      i. Higher risk urban areas in California include those areas defined above, areas in previously infested counties, in areas where there are high proportions of properties with backyard grapes or are in areas with small wineries. Monitor these areas at 25 traps/square mile based on risk assessments by the local County Agricultural Commissioner.
      ii. At risk urban areas in the rest of the state and outside of the core infested areas should be monitored at five traps/square mile. These include areas near commercial grape

production or areas with high proportions of backyard grapes. “Near” would be a minimum of 500 meters but could increase to one to three miles with risk factors such as high proportions of yards with vines or close proximity to previous EGVM infestations. This trapping can be “piggy-backed” onto other trapping programs where applicable.

2. Delimitation trapping:
   i. Monitor at 100 traps/square mile in the core square mile of all new finds for one full flight for finds during first or second flight and until after the first flight of the following year for finds in the third flight.
   b. Trap at 25 traps/square mile for a three mile buffer around core find area.

III. TRAPPING QUALITY CONTROL:

A trapping quality control program is needed to ensure that post eradication monitoring is effective as recommended in the CDFA “Insect Trapping Guide” (13th Ed., 2013. https://www.cdfa.ca.gov/plant/pdep/Insect_Trapping_Guide/index.html):

1. All traps should be inspected twice, by separate inspectors, prior to being discarded.
2. Ensure that all trapping personnel are adequately trained to recognize a suspect EGVM in a trap.
3. Consider ‘seeding’ traps with marked EGVM (available from the APHIS Otis or USDA-ARS laboratory) for an additional test of trap screening effectiveness.

IV. DETECTION EDUCATION AND OUTREACH

A targeted public education and outreach campaign should be part of any post-eradication plan. This could include printed materials, advertisements in trade publications, information on websites (county extension/agriculture sites, www.bugspot.org and www.HungryPests.com) or social media (Hungry Pests on Facebook www.facebook.com/hungrypests, Planting Seeds Blog plantingseedsblog.cdfa.ca.gov), and a toll free phone number for reporting possible EGVM finds. Target audiences would include growers, extension agents, crop consultants, or any other interested parties. It should encourage the reporting of EGVM damage or presence to county, state, or federal agricultural officials. It should also emphasize importance of county and state run traps for early detection and encourage education of fieldworkers so they can recognize EGVM in the field. To be most effective, this should be both a California and a national campaign.

County, state and federal officials should develop joint protocols for communicating reported finds. Also, an entity should be designated to follow up on reported finds in a short time period (ideally the county agricultural commissioner). These protocols should include rapid response on the part of program personnel to deploy traps and coordinate treatments, if needed.

In areas where EGVM is detected, frequent meetings with growers, pest control advisors/applicators, chemical dealers and industry groups (Farm Bureau, grower groups, etc.) should be held to discuss finds and treatment protocols. In addition, local governments (city and

county), environmental groups, agricultural labor advocates (California Rural Legal Assistance), business groups (chambers of commerce), and civic service organization (Rotary, Lions Club, Kiwanis, etc.) should be engaged as soon as possible.

Post eradication activities should not only include continued monitoring, but also an educational component focusing on possible pathways that may allow for the introduction of EGVM and other similar invasive pests of grapes. To this end, outreach should also target wineries, and vineyard and winery equipment importers addressing the dangers of importing agricultural and winery equipment, as well as vineyard supplies or live plant material from areas or other locations known to be infested with EGVM.

V. POST ERADICATION FUNDING and RESOURCES

1. Program Review

Programmatic review is important and should be ongoing during the year with an annual review of program status. This review will be needed to ensure post eradication activities are implemented and running effectively. It is anticipated that some level of cost share between Industry, CDFA, and USDA-APHIS will be necessary to ensure the maintenance of minimum detection and response standards for a post-eradication period. Though hard to predict, different scenarios can be developed for possible future costs. For example, we can calculate the costs associated with the simplest case, trapping the entire state at recommended levels and the costs that would be associated with a single outbreak. It may be prudent to have in reserve funds needed for a response for a potential larger outbreak. Each county level work office should have access to a contingency fund at a level of sufficiency to be able to address the immediate response costs associated with potential EGVM reintroductions.

2. Supplies

Program managers and APHIS staff will maintain regular contracts with suppliers of pheromone for traps, mating disruption, delta traps, stakes, etc., to ensure that adequate supplies of these critical program components are available each year for an immediate response.

3. Cost estimates for trapping

Cost estimates for trapping assumes a higher rate of trapping in previously infested vineyard and urban zones in Napa and Sonoma for at least the first year after eradication is achieved. For the rest of the state, estimates are based on the grape commodity trapping recommendations.

a. Cost basis for vineyard trapping:
   i. $77/trap/two flights (six months) ($13/trap/month)
   ii. $96/trap/three flights (seven and a half months)
   iii. 865,000 bearing acres; (928,000 all acres [=bearing and non-bearing]) (from 2014 Ag Stats)

iv. 34,139 traps in bearing acres based on 25 traps/square mile; (36,250 traps in all acres)

v. Total cost for two generations: $2.63 million for statewide trapping for bearing acres for two generations at 25 traps/square mile serviced every two weeks; ($2.79 million for all acres)

vi. Total cost for three generations: $3.28 million for bearing acres; ($3.48 million for all acres)

b. Cost Basis for urban trapping:

i. Urban traps - $55/trap for five months (based on one higher-cost county [Napa or Sonoma]; likely lower for lower-cost counties) or $11/trap/month. For Napa, estimate 510 traps are needed. For Sonoma, 100 traps.

ii. Total = $33,550 for Napa and Sonoma.

4. Cost estimates for a new find

a. Delimitation Costs for one detection:

i. Minimum area is 36 square miles (three mile radius)

ii. Minimum number of traps is 975 (core at 100 traps/square mile, others at 25 traps/square mile)

iii. First year (service weekly): $192/trap/three flights in buffers (875 traps), $258/trap in core (100 traps) (based on one high-cost county [Napa]; likely lower for lower-cost counties)

iv. Subsequent years (service every two weeks): $96/trap for three flights in buffers, $129/trap in core

v. First year total: $193,800

vi. Subsequent years annual total: $96,900

vii. Total for a three-year delimitation: $387,600

b. Treatment costs (grower):

Based on grower costs, and the EGVM Technical Working Group (TWG) recommended two pesticide treatments, this would cost $150/acre for foliar treatment, and $250/acre for mating disruption, for a total cost of $400/acre. A single find would require treatment in a 500 meter radius from the find site which encompasses about 200 acres if the entire area is planted in grapes. This would result in treatment costs of $80,000 ($400/acre X 200 acres) for one year. In the second year, there would not be any mating disruption costs so the second year cost would be $30,000 ($150/acre X 200 acres) for this example. For each additional site of an infestation, the control costs for commercial vineyards would run at a maximum cost of $110,000 ($80,000 + $30,000) for a two year control program when both foliar treatment and mating disruption are used.

c. Treatment costs for urban areas (CDFA/USDA):

These costs will be dependent upon the extent of the properties in the area with grapes needing treatment. Costs will be based on treatment with *Bacillus thuringiensis* or fruit removal.

APPENDIX I: Program Response for an EGVM Find in a Regulated Area.

These are the treatment and trapping requirements for the area where an EGVM quarantine has been triggered**. When a single life stage of EGVM is detected, production areas within 500 meters of the find should be:**

1) Treated with program-recommended insecticides during the first and second generations of each year for two complete growing seasons following the year of the detection.
2) Treated with mating disruption for two full flights following the detection. When using mating disruption, if moths are trapped in an area during the first flight of a season, mating disruption treatments should be applied. If they are trapped in the second flight, mating disruption should be applied the following spring.
3) Surveyed visually during the first generation for EGVM larvae in vineyards treated with mating disruption by sampling 100 clusters at 25 trap sites/square mile in treated areas.
4) In the second year after the detection (the year following when two full flights of mating disruption was applied), trapping is increased within 500 meters of previous finds to 100 traps/square mile in production areas, 100 traps/square mile in urban and residential areas, and 25 traps/square mile in any riparian or wild areas that may be harboring wild or feral grapes.
5) If there are no additional finds in the area after at least six full flights, the area becomes eligible for deregulation. Mating disruption dispensers cannot be present in areas being monitored with traps to confirm eradication. Dispensers deployed in the previous year should be removed from the field.
6) Residential, urban, and natural areas:
   Use host removal or *Bacillus thuringiensis*; in combination with the use of mating disruption, in large areas with urban grapes where practical.