

Grape Berry Moth Management

GRAPES 101

Grapes 101 is a series of brief articles highlighting the fundamentals of cool climate grape and wine production.

By Tim Weigle



GBM females lay their eggs on developing grape berries. Larvae burrow into the berry, feeding internally. Understanding the timing of GBM and the influence of the surrounding habitat on GBM pressure in the vineyard are keys to effective spray timing and management. Photo by J. Ogradnik.

The grape berry moth (GBM), *Paralobesia viteana*, is the primary insect pest of grapes grown in the eastern United States. The female GBM typically lays her eggs directly on the berry. When the eggs hatch, the larvae are in the perfect location to immediately begin feeding directly on the grape berries. Their feeding causes both crop loss and contamination, and damage from late season feeding creates an entryway into the berry for the complex of late season rots. Most growing regions can expect two to three generations of GBM each year. Over the past 30 years, GBM management recommendations have been driven by changes in grape prices, government insecticide regulations and canopy management practices. The latest model incorporates both weather data and an understanding of insect biology to improve risk assessment and inform spray schedules.

Grape Berry Moth Risk Assessment Protocol

Early systems were based on the application of three insecticides, using a timing that was based both on the grapevine's growth stage and the calendar. In response to dropping grape prices in the 1980s, the [Grape Berry Moth Risk Assessment Protocol](#) was developed, based on the vineyard's history of grape berry moth damage, climate (i.e. winter low temperatures plus snow cover) and proximity to woods. This protocol provided growers with a roadmap for GBM management by

specifying the timing of scouting and insecticide applications using the vineyard's risk classification. It was a significant step forward compared to the calendar-based insecticide program of the past, but its calendar-based mid- and late-season scouting and insecticide timings were not effective in controlling late-season GBM damage, which was on the increase due to the government's decertification of many broad-spectrum insecticides, new training systems that created larger, denser canopies (primarily in the Concord industry), and overall warmer temperatures throughout the growing and dormant seasons.

Phenology-Based Degree-Day Model

In response to the breakdown of the GBM RA Protocol, research and extension staff from Cornell, Penn State and Michigan State University sought alternative management strategies for GBM that replaced calendar-based scouting and insecticide sprays with a growing degree-day model to predict the peak of the damaging larval phase of each GBM generation. Because insect development is driven by temperature, the warmer the temperatures over a period of time the more quickly a grape berry moth will complete its life cycle. GBM typically completes two to three generations per year in New York state. Conversely, cooler temperatures will delay GBM development, requiring more time to complete a life cycle. Research showed that 810 degree days are required for grape berry moth to complete a generation, so in the model, a base temperature of 47.14°F is used.

Degree-day calculation example:

To calculate degree-days, the high and low temperature for a 24-hour period—usually midnight to midnight or 8 a.m. to 8 a.m.—are recorded. The high and low temperatures for the day are added and then divided by two to calculate the average daily temperature. The base temperature—which in the case of the GBM model is 47.14°F—is then subtracted from the daily average to give the degree day accumulation for that day. An example is provided below for a day with a high temperature of 84°F and a low of 56°F.

$$84 \text{ (high temp)} + 56 \text{ (low temp)} = 140$$

$$140/2 = 70 \text{ average temperature}$$

$$70 \text{ (avg. temp)} - 47.14 \text{ (base temp)} = 22.86 \text{ degree days for that day}$$

Degree-days are then added to get accumulated degree-days over days or weeks. If the average temperature is ever lower than the base temperature, zero degree-days are recorded for the day. There is never a negative accumulation of degree-days.

The research and extension team conducted trials to examine scouting and insecticide applications based on GBM life cycle development using degree-day accumulation rather than the calendar. Work continues on how to determine the best method for starting the accumulation of degree-days. Current research uses the date of wild grape bloom as the biofix, or starting date, because GBM development and wild grape phenology are closely linked early in the year. Other ideas for developing biofix dates are male pheromone trap catch results and degree-day accumulations with a January 1 start date. Research shows potential for a reduction in the use of insecticides using the phenology-based degree-day model without increased crop loss.

Using the Model:

The model is available on the [Network for Environment and Weather Applications \(NEWA\)](#) website. NEWA downloads weather parameters from weather stations across the state, so most grape growers are able to access results specific to their region. Growers are able to choose the weather station location and a biofix date (based on the timing of wild grape bloom near their vineyard) to automatically generate predictions for their area. As the research projects continue into the implementation and demonstration phases, the potential for a new industry standard in GBM management is on the horizon.

Further Information

Martinson, T. E. and T. J. Dennehy. 1991. [Risk Assessment of Grape Berry Moth and Guidelines for Management of the Eastern Grape Leafhopper](#), New York's Food and Life Science's Bulletin 138. New York State Agricultural Experiment Station, Cornell University.

Riedl H. and E. F. Taschenberg. 1984. [Grape Berry Moth, *Endopiza viteana*](#), New York State Grape IPM Factsheet, Cornell University.

Weigle, T. 2010. [Grape Berry Moth YouTube video](#)

Tim Weigle is senior extension associate with the New York State Integrated Pest Management Program and the Lake Erie Regional Grape Program.