Using Pheromone Traps to Predict infestation by Grape Berry Moth, *Paralobesia viteana* in the Texas Gulf Coast Region

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Grape Berry Moth (GBM) is a significant pest of wine grapes in the Texas Gulf Coast, Northeast Texas, and Hill Country growing regions. Damage to developing fruit by GBM can significantly increase the risk of late season bunch rots in those regions, which result in decreased yields, wine quality, and overall marketability of fruit. Currently, there is no information published regarding the timing of emergence of GBM, timing of GBM treatments and the relationship to berry infestations in Texas. Also, little is known about whether trap captures can be used to effectively determine when treatments are needed. Thus, growers do not have a resource for determining timing of insecticide sprays.

In a field study initiated during the 2007 growing season, sticky traps containing female GBM sex pheromone were placed in six Gulf Coast vineyard sites and were monitored weekly for number of male GBMs. In the 2008 growing season, clusters of selected vines in each site were monitored for berry infestations by hatched GBM larvae, to determine the time from male flight activity to berry infestations.

The first objective of this study was to determine the time of emergence for the first and successive generations of GBM in the Texas Gulf Coast in order to produce recommendations for monitoring and control. The second objective was to determine if increases in capture of male GBMs in pheromone traps is correlated with the increase in berry infestations observed in grapevines.

Materials and Methods

In a preliminary study during the 2007 growing season, three sticky traps containing female GBM pheromone caps (Pherocon® 1C traps and pheromone caps, Trece, Inc., Adair, OK) were set in a total of six Gulf Coast region vineyards: two in Fort Bend County and four in Austin County. Male GBMs were captured and removed from traps weekly to establish the presence and first emergence of GBM in the test sites. Each vineyard block was planted with either Blanc Du Bois or Black Spanish wine grapes, with the exception of site F, which was planted with Merlot.

The presence of GBM was established in all six test vineyards and in 2008 the study was expanded to include six pheromone traps per site and the systematic monitoring of berry infestations in each vineyard. A test block was established in each site and traps were distributed along a rectangular grid field pattern, and placed in the fruiting zone of the vines. Each block was approximately 2 to 4 acres in size. A total of 18 vines were selected in each block for cluster monitoring, also on a rectangular grid pattern. Pheromone traps were located at least 3 meters from monitored vines. Pheromone traps and all clusters of the test vines were monitored weekly, beginning two weeks before bloom. Each week, male GBMs in each trap were recorded and removed from traps. Fresh pheromones and sticky cards were installed at 4 week intervals. Clusters of the 18 test vines were also inspected weekly to determine the incidence and severity of berry infestation by GBM larvae. Infested clusters were tagged and berries were marked with a ball-point pen in order to avoid re-counting infested berries in following weeks. All vineyards were subject to a standard insecticide program for controlling GBM, using either Sevin XLR or Intrepid 2F, or a rotation of the two products. Insecticide treatments began at bloom and were repeated 2 or 3 times per season in two-week intervals.

Increases in average of male moth captures were analyzed for correlation with cluster infestations at 0, 1, 2, and 3 weeks delay, using Microsoft Excel.

Results and Discussion

A combined analyses of all 6 test sites showed that trap catches of male GBM were most highly correlated with berry infestations occurring one week later (Correlation coefficient = 0.47). Correlation coefficients range from -1 to 1 – with -1 indicating a perfectly negative correlation (one variable increase as the other decreases), 1 indicating a perfectly positive correlation (one variable increases similarly to another variable), and 0 indicating no correlation. Thus, in this study, we were looking for correlation coefficients as close to 1 as possible. Trap catches of male GBM were less correlated with berry infestations two weeks later (Correlation coefficient = 0.38). There was no correlation of trap catches with berry infestations at week 0 (date of the trap catch, Correlation coefficient = 0.09) and 3 weeks after trap catches (Correlation coefficient = 0.05).

Correlations of trap catches and berry infestations differed between the 6 sites (labeled 'A' through 'F') in this study. Correlations between trap catches and infestations with one week time delay ranged from 0.03 to 0.91 and from 0.11 to 0.65 with two week time delay. A very strong correlation was observed in site 'A' at one week delay (Corr. 0.91), followed by a sharp decrease at two weeks delay (Corr. 0.38) (Figure 1). Site D also showed strong correlation at one week delay (Corr. 0.75) and a decrease at two weeks delay (Corr. 0.50) (Figure 2). This data showed that an increase in berry infestations is likely to occur within one week after an increase in adult male moths occurs in traps. This suggests that a grower could use trap catch data of adult male GBM to improve spray timing to control the first generation of hatching larvae in clusters.

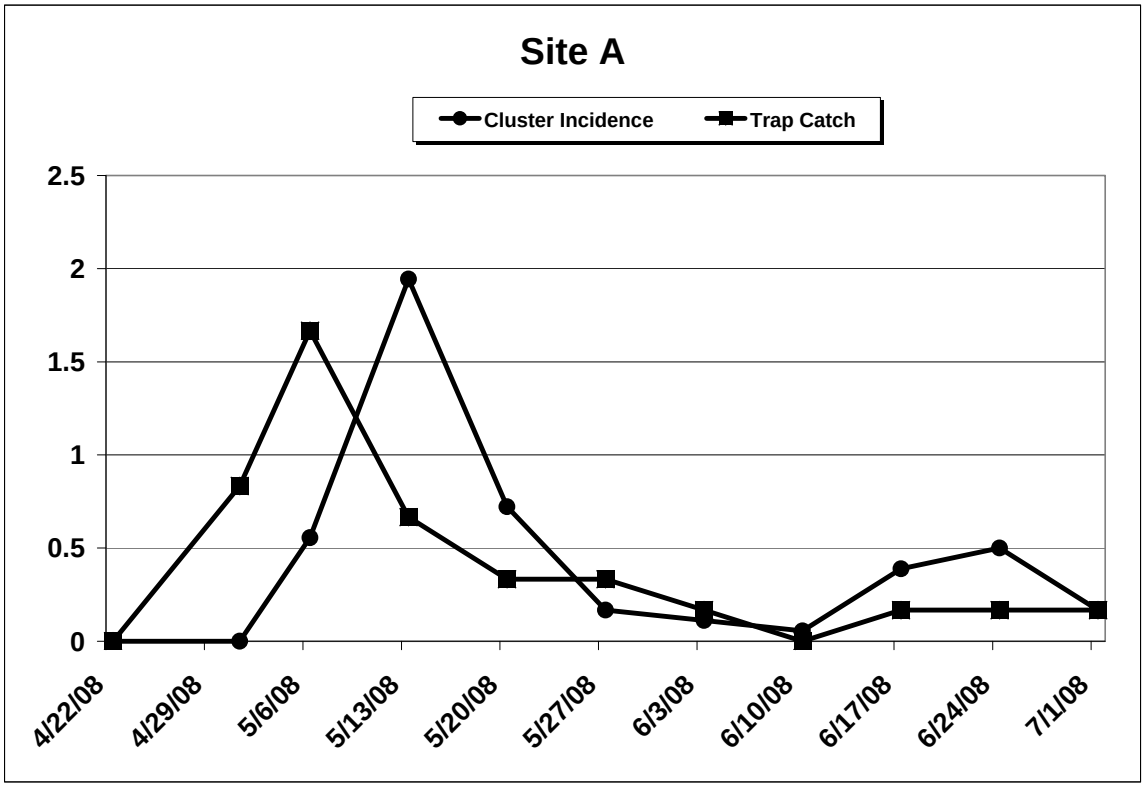

Figure 1. Average catches of male GBM and incidence of cluster infestations during the 2008 growing season, site A.

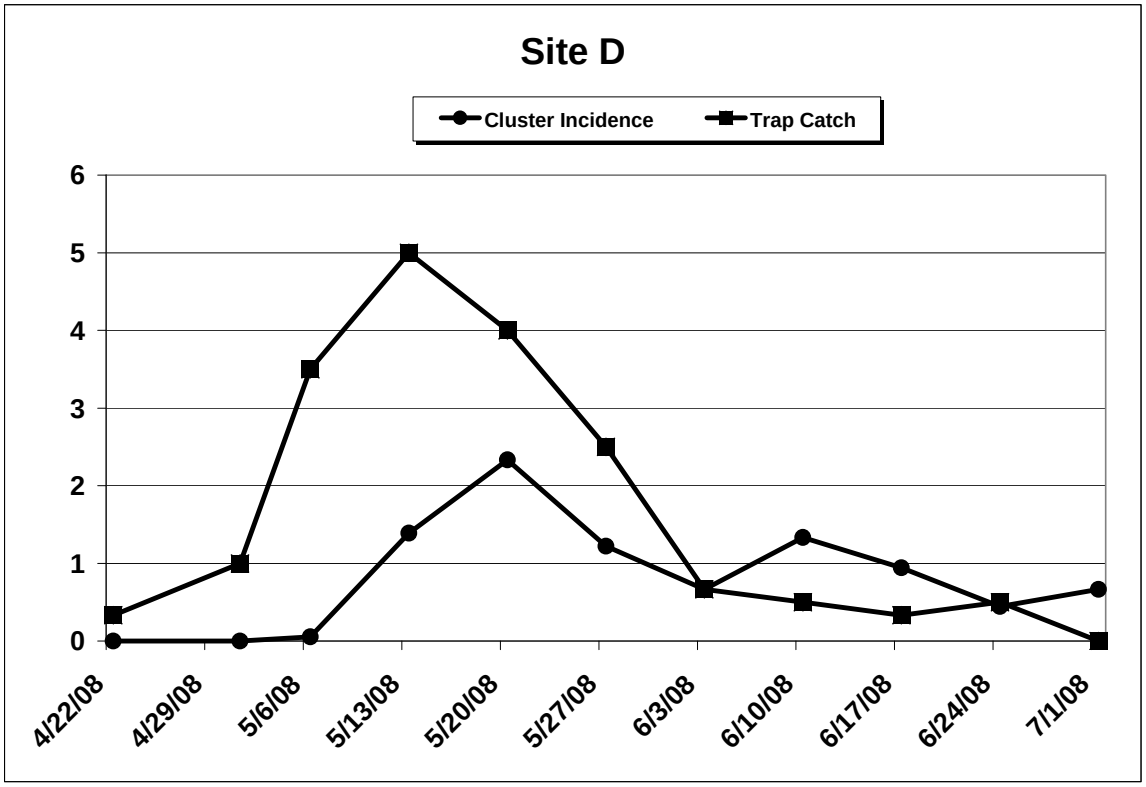

Figure 2. Average catches of male GBM and incidence of cluster infestations during the 2008 growing season, site D.

This study is being repeated during the 2009 growing season. Additionally spray trials are being conducted during the 2009 growing season to test the timing of spray applications in relation to the first male moth captures in pheromone traps. The objective of the 2009 study is to determine what spray timing will have the greatest impact on reducing the incidence of infestation by first generation GBM larvae. A more concise understanding of insecticide timing will improve efficacy of insecticide sprays and may reduce wasteful or excessive use of insecticides in the vineyard. Future research will also link timing of emergence to key growth stages of native and cultivated grapes and to growing degree day models, so that growers will gain awareness of environmental cues for timing insecticide sprays.

Applications of Research

- The data in this study shows that the first increase in berry moth trap catches is strongly correlated to berry infestations observed one week later.
- It is concluded that pheromone trapping may serve as a key indicator for commencing an insecticide spray program for GBM in the Texas Gulf Coast region.
- This study suggests that insecticide sprays should be applied within one week of the first increase in trap catches in the vineyard if growers wish to reduce the incidence of first generation GBM infestations.

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