Development and delivery of Alternative Management Strategies for Eastern US Vineyards.

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Project location(s):

Grape Growing Regions of New York, Pennsylvania, and Michigan

Abstract:

Background and justification

Grape berry moth (GBM) *Endopiza viteana* is the key arthropod pest of grapes in New York, Pennsylvania, Michigan and other grape-growing regions east of the Rocky Mountains (Taschenberg 1945, Weigle and Muza 2003). Larvae feed directly on fruiting structures causing yield loss and perhaps more significantly, contamination. Prior to the late 1980s GBM in central New York and the Lake Erie grape belt of western New York and western Pennsylvania was kept in check through 3 to 5 applications of a broad-spectrum insecticide (most commonly parathion or carbaryl) (Taschenberg et al. 1964, Martinson et al. 1991). Although effective, this management program was expensive, disruptive of natural enemies, and potentially detrimental to the environment and food safety. (Indeed, in response to the Food Quality Protection Act (FQPA) of 1996, parathion has been banned for use on grapes, use of two other organophosphate insecticides have been restricted (guthion and phosmet), and carbaryl is currently under review.) Food safety is of particular concern since most of the grapes in New York and Pennsylvania (75%) are used for sweet juice mostly consumed by children. In recent years there has been a major increase in damage to fruit from GBM resulting in 1) loss of crop due to the grapes not being picked for fear of rejection at the processing plant, 2) loss of tonnage by direct feeding on grape berries and 3) rejection at the plant due to exceeding the damage threshold used by area processors. Due to a number of factors our current control strategies are not as effective as in the past and there is a need to develop new strategies that address changes in the regulatory environment and take into account other arthropod pests found in grapes.

Response – Working in collaboration with entomologists in Michigan and Pennsylvania, we will address the following four objectives.

1. Refine and validate temperature-based model for accurate prediction of GBM phenology.
2. Evaluate pheromone mating disruption for control of GBM at commercial vineyards.
3. Evaluate and demonstrate reduced-risk grape pest management programs to the eastern US grape industry.

4. Deliver new approaches to diverse grape industry stakeholders.

Objectives:

The primary responsibility of the New York State Grape IPM program was to 1) Evaluate pheromone mating disruption for control of GBM at commercial vineyards which is covered in this progress report.

Procedures: list them for each of the numbered objectives

This Westfield, NY vineyard was selected for its moderate to high risk of damage from grape berry moth (GBM) on an annual basis. The 20 plus acre vineyard is bordered by woods on the south (high risk edge) , US Route 20 on the north and by a commercially managed 'Concord' vineyard on the east. The control block of this experiment was placed on the western edge of the vineyard block that borders a 'Concord' vineyard that has received minimal inputs for the past decade or more. Prevailing winds are from the Northeast in this area so placement of the control block to the west of the treated areas was made to reduce the amount of the pheromone cloud from treated areas compromising the control block.

Four treatments were applied to the vineyard blocks of approximately 5 acres each:

1) 200 ties per acre which is the labeled rate of Isomate- GBM Plus

2) Low rate of 50 ties/acre

3) Low rate in interior, high rate of 400 ties/ A around vineyard edge

4) Control, no pheromone mating disruption

Results and discussion:

Pheromone trap monitoring: If the application rate of pheromone twist ties is adequate there should be no, or very limited trap captures in the treated blocks as the resulting pheromone cloud should disorient the males making it impossible to follow a pheromone trail leading to the trap.

Table 1. Cumulative number of GBM capture in pheromone traps according to treatment during the 2006 and 2007 growing seasons.

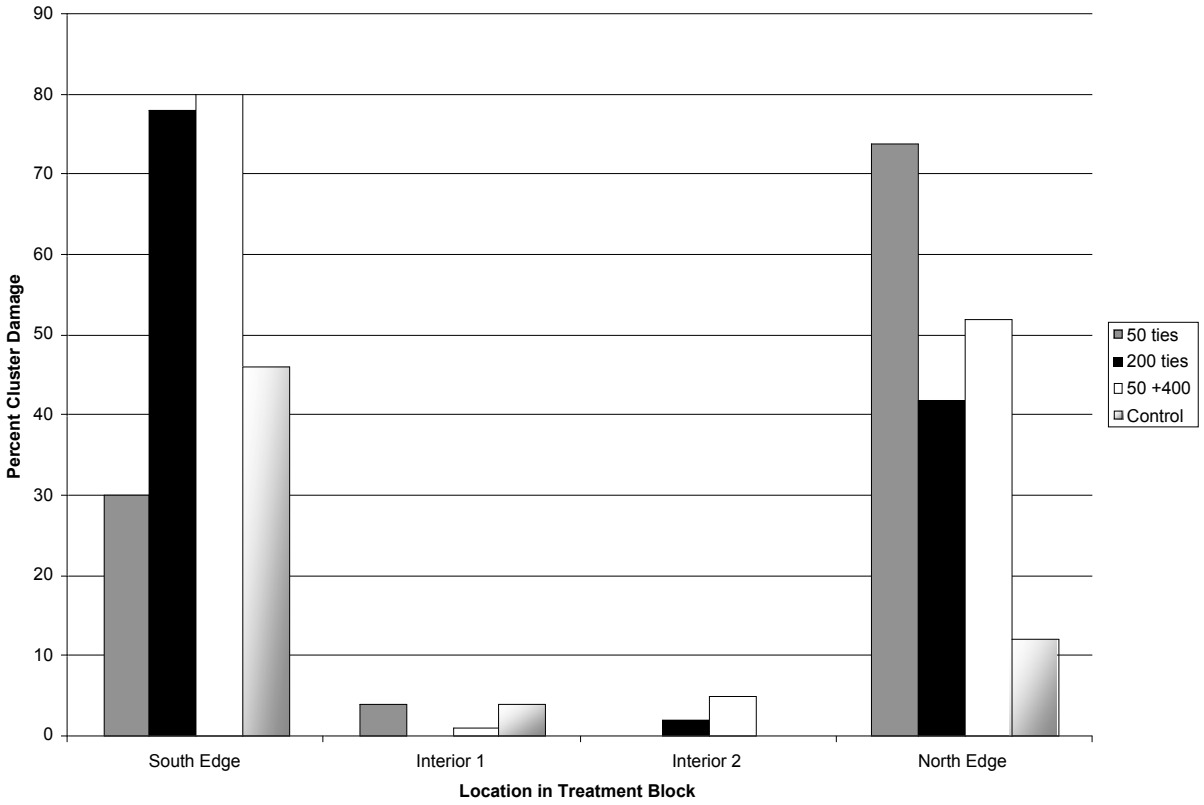
	Cumulative GBM recorded in Traps	
Treatment	2006	2007
Labeled Rate: 200/Acre	0	1
Low rate: 50/A	0	5
Low Rate + High rate on Border 50/A + 400/A	0	0
Control: No Isomate-GBM^{+}	56	404
Edge of Woods Near Control	19	14

After seeing very little in the way of grape berry moth pressure during the 2006 growing season you can see by Table 1 that captures of male GBM in the control block were very high. Peak captures occurred during the July 5-7 (101 captures), August 15 – 17 (72 captures) and August

24- 27 (90 captures) time frames. Although increased trap captures have not been shown to directly correlate with increased damage, it is apparent from the pheromone trap results that even the low rate of Isomate-GBM+ provided enough of a pheromone cloud to effectively confuse the majority of male grape berry moth while the higher rates effectively shut down the moths' ability to orient to the pheromone capsule in the traps.

Cluster evaluations: Clusters were evaluated for the presence of GBM stings during the weeks of July 9-13 and August 6 – 10 with a pre harvest evaluation conducted for all treatments during the week of September 10-14.

Chart 1. Comparison of cluster damage at harvest between Isomate-GBM Plus treatments and control in Westfield vineyard.

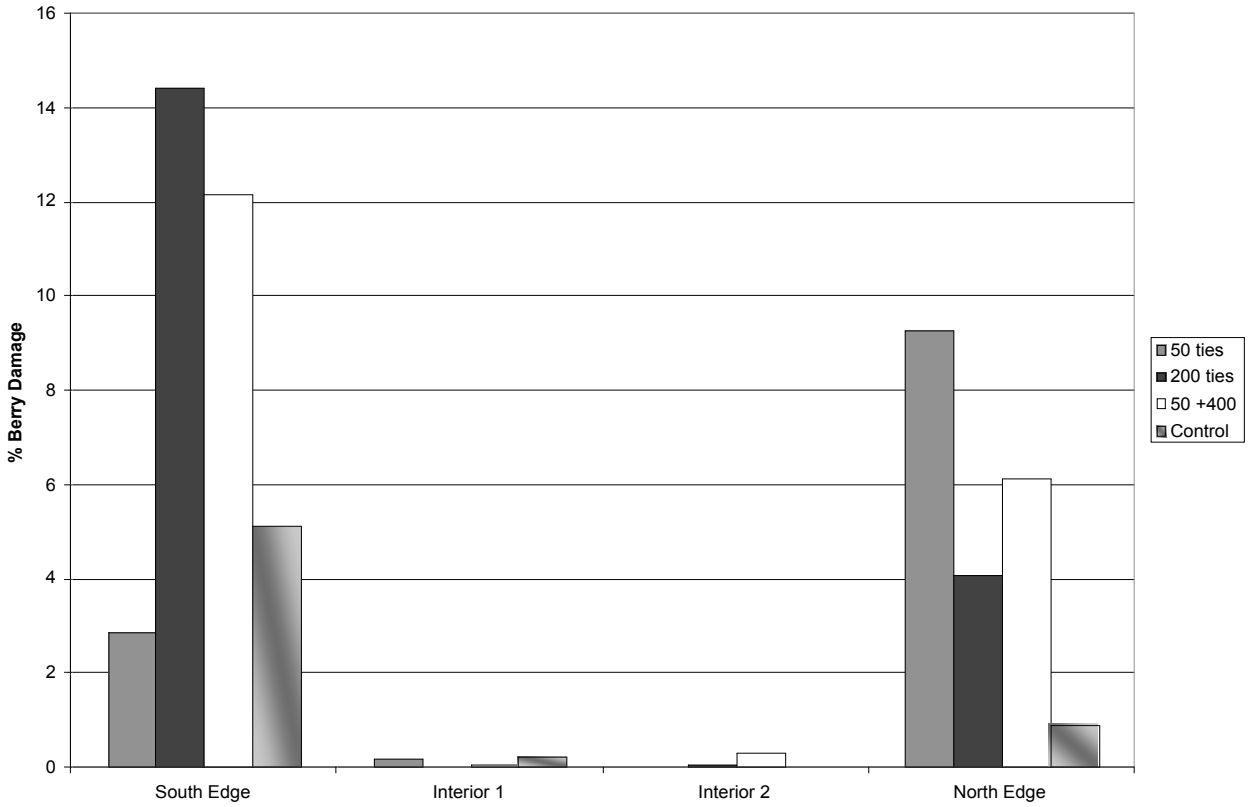


The low levels of GBM cluster damage in the interior of all treatments can be best explained by the strong edge effect exhibited by grape berry moth where populations and damage are concentrated on the outside 6 rows, or three post lengths, of a vineyard. Cluster damage levels in the three mating disruption blocks indicates that under high pressure situations as was seen in the Westfield vineyard in 2007, mating disruption is not a viable stand alone option for the vineyard edge.

Two percent berry damage from grape berry moth is the federal inspection standard used for processing grapes. The results shown in Chart 2 should be viewed as very conservative results to the way harvest evaluations are done. Clusters are picked by hand, brought into the lab and each berry is removed from the cluster and examined. Even the smaller damage caused by grape

berry moth is counted as a damaged berry. Due to the damage caused to the berry by older mechanical harvesters during the harvesting process it has not been uncommon for much of the grape berry moth damage to be blended in with good berries or to be misidentified and placed in a category with a higher standard of 8 percent. All the grapes from all the treatments made it through inspection at the processing plant with no loads rejected for grape berry moth.

Chart 2. Comparison of berry damage at harvest between Isomate-GBM Plus treatments and control in Westfield vineyard.



The control in this project was the grower standard insecticide spray schedule. The growers who operate this vineyard have been using the grape berry moth risk assessment protocol for 18 years and have greatly decreased their insecticide use over that time on their 200 acres of vineyard. The weekly scouting reports for both the treatment blocks and the control block allowed them to make the decision to not apply any insecticide this year in the control block. Comparing berry damage across the treatments it would be difficult to justify the cost involved in the use of mating disruption in a high risk block like the Westfield Vineyard. More work needs to be done to see how mating disruption can be incorporated into a GBM management strategy involving other management tools such as insecticides and biocontrol.