

NYWGF RESEARCH - FINAL REPORT

Funding for fiscal year: 2024-25

SECTION 1:

Project title: Understanding late-season damage from grape berry moth

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New Research **Continued Research**

Amount Funded \$13,290

SECTION 2:

Project Summary Impact Statement:

Growers continue to experience problems with grape berry moth (GBM), especially late in the season. Insecticide resistance and changes in flight phenology are two possible explanations. Research conducted at CLEREL in the first year of this project revealed significant resistance to one pyrethroid, fenpropathrin [Danitol 2.4EC], but not to other pyrethroids or other insecticide classes used by the industry. Poor timing of insecticide applications may also be contributing to the problem. Using grapes at CLEREL, we intensively monitored GBM flight activity using newer generation black light traps based on LED UV lights and egg-laying to compare capture patterns in relation to degree day accumulation and recommendations from the NEWA GBM phenology model. We initiated trapping of adult GBM using LED UV lights in early June, 2024 with 4 traps along the edge row of a Concord research vineyard at CLEREL. Traps were checked for contents 2 to 3 times per week. We also began monitoring clusters for new GBM eggs in early July. Black lights captured thousands of insects, including Diptera (midges, mosquitos, small beetles and Lepidoptera (many different moth species). Unfortunately, and for reasons we do not understand, the traps only captured 2 male and 1 female GBM. This is despite finding significant GBM larval infestations in clusters, especially later in the season. GBM eggs were difficult to detect and relatively few eggs were found. Therefore, we were not successful in achieving our principal objective to compare GBM flight activity with degree day accumulations and predictions of the GBM phenology model. We plan to examine the UV spectra of the new LED lights compared to the older generation UV lights that were successful in capturing female GBM.

Objectives:

1. Compare predictions by the NEWA GBM phenology model with actual GBM flight and egg-laying activity

Materials & Methods: 1. Compare predictions by the NEWA GBM phenology model with actual GBM flight and egg-laying activity

To assess GBM flight activity we deployed 4 black light traps along edge row (southern edge) of the railroad Concord research vineyard at CLEREL in Portland, NY. This research vineyard has a history of high GBM damage. There was a significant freeze event in the Lake Erie Grape Belt in the spring of 2024 that significantly reduced clusters in this Concord vineyard, although there was sufficient fruit to warrant its use for this experiment. The traps were made by Dynatrap (model: DT1130) with LED UV light source. The trap includes a small fan to suck in insects into a holding trap for later counting. The light and fan were powered by 12 V marine batteries, linked to the light through an inverter. Trap contents were emptied and checked for GBM twice per week. We also enumerated the number of fresh eggs laid on berries in the same area as where we deployed light traps, inspecting approximately 500 clusters twice per week starting in July. Although initially we planned to continue monitoring into September, we captured so few GBM in traps and so few eggs were found on clusters that we terminated monitoring in August. Moreover, a key member of the CLEREL team responsible for monitoring became seriously ill and was not available for late summer and harvest.

Results/Outcomes/Next Steps:

We had some initial issues with keeping the lights running throughout the night, though this was solved by July. The traps captured literally thousands of insects every week including Diptera (mostly midges and mosquitos), caddice flies (Order Trichoptera, related to moths and butterflies), mayflies (Order Ephemeroptera), beetles such as European chafers, lacewings (Order Neuroptera), and several species on moths (Lepidoptera) including cutworms, army worms, wood nymphs (all Noctuidea) and grape leaf folder (Family Crambidae). Unfortunately, and to our surprise, we only captured 4 individual GBM, all males. We currently do not understand why the traps were unsuccessful in capturing GBM while capturing many other insects. This is despite having reasonably good success using UV lights in the past to capture both male and female GBM. The UV light source on these older, more successful traps was an older style florescent bulb. In comparing the older style with the new LED UV bulbs after the field season, we found that they had slightly different wavelength spectra.

We began examining grape clusters along the edge of the Concord research vineyard after berries sized up. Unfortunately, we did not observe many eggs. After only finding a total of 7 eggs from mid-July through mid-August we stopped monitoring.

Because of lack of captures of GBM in light traps and finding very few eggs on clusters, we were not able to examine how well the GBM phenology model is currently predicting female flight phenology. This remains an important question to address in exploring the reasons why the industry, especially in the Lake Erie Grape Belt, is experiencing increasing levels of late-season GBM damage. Based on previous success using UV light traps to monitor female GBM phenology, we still believe extensive trapping could be used to address this question. However, traps and attractive light source need to be more effective than the types used in this study. Comparing the old-style traps with these newer ones would help to make improvements. In addition, there are alternative approaches to assessing phenology worth pursuing such as extensive and regular monitoring of the number of maturing of larvae from infested fruit in the field.

Technology Transfer Plan:

Given that we were unsuccessful in capturing sufficient numbers of female GBM to infer flight phenology, we were unable to compare phenology with predictions of the NEWA GBM model. Therefore, we do not have any new knowledge to provide growers on this important questions.

Attachments: relevant charts and graphs, photos etc.

SECTION 3:**Project summary and objectives:**

We used UV light traps to capture male and female GBM and monitored GBM egg numbers on clusters in a research vineyard to female activity to compare with predictions of the NEWA temperature-driven GBM phenology model to see if a mismatch between actual phenology and predicted phenology might help explain increasing problems with late-season GBM infestations, especially in the Lake Erie Grape Belt. Unfortunately, we captured too few female GBM in traps and observed too few GBM eggs on clusters to test our hypothesis. We have had success in the past using UV traps for GBM, so our next step is to discover why the newer traps were not effective. The NEWA model was developed over 20 years ago and it is very possible that it no longer is accurately predicting peak flight activity, although other explanations for the increase in late-season damage need to also be investigated.

Importance of research to the NY wine industry:

Growers continue to experience problems with grape berry moth (GBM), especially late in the season. To develop appropriate management approaches to address this problem it is important to determine causal factors, of which there are several possibilities. Previous research indicates that reduced effectiveness of insecticides is probably not the major driving factor, although it may contribute. Changes in GBM phenology, resulting in poor correspondence with predictions of the NEWA GBM temperature-driven phenology model, is a likely important factor that needs further investigation.

Project Results/next steps:

Assessing GBM phenology in the field and comparing it to predictions of the NEWA GBM model is an important next step. Making improvements in the efficiency of UV light traps in capturing female GBM is one approach to pursue but also using the age structure of larvae collected from infested fruit through the season is a possible alternative approach. We also think it is important to explore other factors that could be contributing to increases in late-season GBM damage. In particular, we strongly encourage new research on diapause initiation in GBM with the hypothesis that GBM is entering diapause later in the season compared to 25 years ago leading to more egg laying late in the season.

Supporting attachments: