



Integrated monitoring of *Lobesia botrana* using LED traps and allelochemicals in pheromone-disrupted vineyards

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With 5 tables

Abstract: Sex pheromone-based mating disruption (MD) is used to manage the European grapevine moth (EGVM), *Lobesia botrana* (Lepidoptera: Tortricidae), in vineyards of Europe and South America. Monitoring of EGVM with sex pheromone lures under MD is difficult and alternative methods to track this pest are needed. A lure comprised of 2-phenyl ethanol and acetic acid (2-PET/AA) is attractive for EGVM but has not been tested under MD nor in combination with light emitting diodes (LEDs) enhancing moths catch. Traps baited with the 2-PET/AA lure with or without LEDs emitting three different peak wavelengths (UV-A, blue, and green) were compared with traps baited with a sex pheromone lure. Experiments were performed in vineyards under MD in both Chile and Spain. Traps with 2-PET/AA with LEDs caught significantly more total moths than traps with sex pheromone lures from late season in Chile. The addition of the UV-A LED significantly increased EGVM catches from the 2-PET/AA lure alone from mid to late season in Chile and Spain. The addition of the UV-A LED with the 2-PET/AA lure outperformed both the blue and green LEDs for females and total moths from late season in Chile and Spain. The proportions of female EGVM mated were not different between treatments, but were variable among trials and increased seasonally. Catches of some groups of non-targets (other lepidopterans and dipterans) increased with the use of the UV-A LED and were on average much greater than of EGVM, but did not prevent the higher catches of EGVM with this treatment.

Keywords: Acetic acid; 2-phenyl ethanol; mating disruption; European grapevine moth; light-emitting diode; trap optimization; semiochemical lures; sustainable pest management

1 Introduction

European grapevine moth (EGVM), *Lobesia botrana* (Denis and Schiffermüller) (Lepidoptera: Tortricidae), is a serious pest of grapevine (*Vitis vinifera* L.) in Central Europe and the Mediterranean regions (Ioriatti et al. 2011; Benelli et al. 2023a) as well as in Chile and Argentina (Taret et al. 2021). Sex pheromone lures are used to monitor adult males but this technique is not effective in vineyards that have been treated with sex pheromone-based mating disruption (MD) (Ioriatti et al. 2011; Ioriatti & Lucchi 2016; Benelli et al. 2023b). An

alternative approach for EGVM monitoring could be the use of allelochemical lures and semiophysical cues that attract both sexes (Gross & Franco 2022; Yao et al. 2024). The ability to monitor EGVM females could provide useful information on their mating status under MD and improve the timing of supplemental insecticide sprays (Knight & Light 2005; Knight et al. 2022).

The uses of microbial and plant volatiles have been evaluated to improve the monitoring of EGVM males and females (Tasin et al. 2018; El-Sayed et al. 2019; Larsson Herrera et al. 2020; El-Sayed et al. 2021). Two volatile organic