The very hungry caterpillar: Temperature and humidity impacts on an insect pest of tree fruits
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ABSTRACT:

Global climate change models predict an increase in the frequency, severity and duration of extreme weather events. Weather extremes are important for poikilothermicspecies limited by their capacity to withstand conditions beyond their optimum for survival and development. To understand insect population dynamics, and forecast outbreaks in agro-ecosystems, we need a better understanding of the biology of insect pests of concern. In this study, I explored physiological responses of Spilonota ocellana (Denis and Schiffermüller) in the context of spring frost and summer drought, by focusing on the most vulnerable life stages. I determined that S. ocellanaspringlarval instars are susceptible to temperatures above their mean supercooling point (SCP), which ranged from -9.1 ± 0.2 °C (4th instar) to -7.9 ± 0.2 °C (6th instar). While supercooling point increased with instar, the median LLT of -7.3 ± 0.4 °C across all instars demonstrates that a hard spring frost would be necessary to cause larval mortality. Exposure to low humidity resulted in lower egg hatch; this effect was exacerbated at higher temperatures. Furthermore, I discovered that exposure to low humidity during the latter half of egg development resulted in reduced survival and faster development rates; similar effects were also observed during a period of hot and dry conditions in an apple orchard. This study provides information on the impacts of extreme weather events on survival and development within and between life stages of S. ocellana, which could have the potential to alter population abundance, phenology, and thus management of this pest.