

Ultraviolet protection of the *Cydia pomonella* granulovirus using zinc oxide and titanium dioxide

Abstract

Cydia pomonella granulovirus (CpGV) is a specific pathogen of codling moth, the most serious pest of apple worldwide and has recently been isolated in China. However, its use for codling moth control is limited by ultraviolet (UV) solar radiation, which is a major factor affecting the field persistence of this virus. The virion is occluded in the granulin matrix of occlusion bodies. Many substances have been tested as sunscreen agents, but little has been published on the use of reflectors with the occluded bodies (OBs) of CpGV. This work investigates the susceptibility of a native GV, CpGV-ZY, to UVB radiation over different time periods and evaluates the protective effect of two sunscreen agents, zinc oxide (ZnO) and titanium dioxide (TiO₂). Laboratory tests showed 10⁴ OB/ml of CpGV-ZY exposed to UVB light (3.5 W/m²) for 3.75 h caused 50% inactivity. At 15 mg/ml ZnO and 10 mg/ml TiO₂, the mortality was highest after 4-h exposure to UVB light. Semi-field tests indicated both compounds are effective as UV protectants at low concentrations. These are the first results confirming that ZnO and TiO₂ hold promise as UV protectants for this CpGV-ZY isolate. Moreover, it is apparently safe and effective to use within the range of concentrations needed for codling moth control.