

Cold Hardiness of Diapausing *Adoxopyes orana* Fischer von Roslerstamm

Hyun-Mi Jo and Yonggyun Kim

Laboratory of Insect Physiology, School of Bioresource Sciences,
College of Natural Sciences, Andong National University, Andong, Korea

Smaller fruit tortrix, *Adoxopyes orana* Fischer von Roslerstamm, overwinters as larval diapause. Relationship between cold tolerance and diapause has been questioned in this species. To address this hypothesis, we compared cold tolerance and major polyol contents between diapausing and nondiapausing larvae after overall cold hardiness assays in all stages. Supercooling points (SCPs) were varied among developmental stages. Adults showed the lowest SCP (-19.8°C). Pupae had the intermediate SCP (-17.8°C). Eggs showed the lowest SCP (-15.2°C). The SCPs (-8.5 to -16.8°C) of larvae increased with their ages. But, all the stages died above their SCPs after a few hour exposure. Cold tolerance above SCPs were compared with different temperatures and exposure times in all stages. Pupae seemed to be the most susceptible stage. The acclimated larvae had higher survival in response to lethal low temperature than the unacclimated. Diapausing larvae were more tolerant than the nondiapausing larvae. These cold tolerance difference was related with trehalose contents analyzed by an ion-exchange HPLC. Field-collected overwintering larvae and laboratory-induced diapausing larvae (20°C, 65%, 12:12 L:D) had significantly higher trehalose contents than did laboratory-reared larvae (25°C, 65%, 16:8 L:D). These results indicate that this tortrix moth is a freeze susceptible species and suggest that trehalose can be a major cryoprotectant conferring cold tolerance to diapausing larvae.