

Cold Hardiness and Polyols of Overwintering Rice Water Weevil, *Lissorhoptrus oryzophilus*

Lee, Ki-Yeol, Yonggyun Kim¹, Kyeongbeom Min, Kisu Ahn,
Kwansoon Choi and Youngduck Chang²

Agricultural Environment Reserch Division, ARES, Cheöngwön,
Chungbuk, Korea,

¹School of Bioresource Sciences, Andong National University, Andong, Korea,

²Department of Agricultural Biology, Chungnam National University,
Taejön, Korea

Rice water weevil, *Lissorhoptrus oryzophilus*, overwinters as adults in reproductive diapause. We compared the cold tolerance between the diapausing and reproductive adults and analyzed the polyols and some diapause-associated proteins. Diapausing adults showed significantly higher survival rates in response to -10°C for 4h than reproductive adults. The cold tolerance of the acclimated adults to cool temperatures was higher than that of the unacclimated reproductive adults, but not so much as that of the diapausing adults. Supercooling points of the adults ranged from -15 to -20°C and were not different between diapausing and reproductive adults. Four monosaccharides (glucose, trehalose, fructose, and sucrose) and three sugar alcohols (glycerol, sorbitol, and mannitol) of the field adults were identified and quantified by an ion-exchange HPLC. Most sugar contents except fructose and sucrose varied with different seasons. The most tremendous change was found in trehalose contents. Diapausing field populations had more than four times higher amounts of trehalose than nondiapause or laboratory reproductives. Polyols kept relatively low contents during seasons except May at which all polyols increased significantly in their contents. Three diapause-associated proteins with the apparent sizes of ca. 100 kDa, 50kDa, and 20kDa were detected on a gradient SDS-PAGE. These results indicate that the rice water weevils undergo adult diapause with elevated cold hardiness. Though the increase of trehalose contents and three diapause-associated proteins characterized the diapausing weevils, their roles in cold hardiness have to be further analyzed.