

Seasonal activity-profiles of enzymes involved in cryoprotectant biosynthesis in *Pyrrhocoris apterus* (Heteroptera: Pyrrhocoridae).

Key Words: Diapause, overwintering, metabolism, enzymes, polyols, Heteroptera, *Pyrrhocoris apterus*.

Abstract

The activities of three enzymes involved in polyol biosynthesis (aldose reductase, AR; ketose reductase, KR; and polyol dehydrogenase, PDH) were studied in adult females of the linden bug, *Pyrrhocoris apterus*, collected from the field during 2005/2006. While the activities of three enzymes were low in reproductive females, activities greater by one or two orders were seen in reproductively arrested females. AR and KR showed similar seasonal trends in activity. Activities were low during diapause initiation and later increased and stabilized during autumnal diapause development. Further increases of AR and KR activities were seen during low temperature quiescence and finally the activities sharply decreased during vernal resumption of direct development. The activity of PDH was relatively high (but fluctuating) during diapause, then decreased in quiescent insects and almost disappeared in reproductively active females. Insects collected in February were subjected to laboratory de-acclimation (exposure to high temperatures) followed by re-acclimation (exposure to low temperatures) which resulted in loss of activity in all three enzymes and no regain. High activities of AR, KR and PDH in reproductively arrested females thus conform well with their previously observed high capacity to synthesize and accumulate polyol cryoprotectants.