DIFFERENT PHYSIOLOGICAL EFFECTS OF PLANT-DERIVED GLYCOALKALOID EXTRACTS ON INSECTS

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Many plants in the Solanaceae family contain glycoalkaloids. They are produced by the plants as natural defence factors against animals, insects and fungi that might attack them. For this reason they are considered to be used in pest control, as alternative to traditional chemical compounds. Unlike conventional insecticides, which are based mainly on a single active compound, plant-derived insecticides comprise an array of chemical compounds which indicate pleiotropic activities, affecting both behavioural and physiological processes in insects. However, our knowledge of the physiological activities of glycoalkaloids in insects is limited. To evaluate the physiological effects of plant extracts on the insect heart contraction and the haemolyph circulation in vitro and in vivo heart bioassays were performed. In vitro studies have showed that potato glycoalkaloid extract inhibits the contractions of the semiisolated heart of Zophobas atratus adult beetles, but was inactive on adults of Tenebrio molitor and Leptinotarsa decemlineata, and Spodoptera exigua larvae. Injections of glycol alkaloid extract to 1-day old pupae of Zophobas atratus, caused major disorders in the heartbeat alternations and rhythmicity and the myocardium contraction frequency. In the third hour after injection, a decrease in the amplitude contractions were observed. Furthermore, the changes in duration of the heart activity phases (anterograde and retrograde) were indicated. All cardiotropic effects of the glycoalcaloid extracts were entirely reversible in the Zophobas atratus pupae. Topical application of the same extract on 1-day old pupae of Spodoptera exigua have showed different effects. It increased the heart contraction frequency, in all phases of the heart activity up to 24 hours after exposition. These are the first reported activities of glycoalcaloids on insects' physiology.

Keywords: glycoalkaloids, cardiotropic effects, insects