Effects of DIMBOA on detoxification enzymes of the aphid Rhopalosiphum padi (Homoptera: Aphididae)

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The presence of glutathione transferases and esterase activity was investigated in Rhopalosiphum padi and the effects of the cereal hydroxamic acid, 2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one (DIMBOA) on these detoxification enzymes was studied. Activity of glutathione S-transferases and general esterases was determined for adult aphids feeding on a natural diet lacking DIMBOA and on an artificial DIMBOA-containing diet for 48 hours. In vivo, DIMBOA in the diet inhibited the activities of esterases by 50-75% at all concentrations tested (0.5-4 mM). The activity of glutathione transferase was inhibited to a lesser extent (30%) at the higher concentrations of DIMBOA. In vitro, DIMBOA generally inhibited the activity of esterases with an IC50 of 33 ?M, and had a slight inhibitory effect on glutathione S-transferases. These effects of DIMBOA could make the aphids vulnerable to electrophilic agents and insecticides which may be metabolized via esterases and GSTs. In cereals, therefore, DI