

ABSTRACT

The chemical defence of Heteroptera is based on the repellent secretion that is very complex and consists of dozens chemical compounds. Heteroptera have good ability to produce/store large amounts of chemical components. The repellent secretion of *Graphosoma lineatum* is composed of many chemicals, such as short-chained aldehydes, which may signal the unpalatability of the bug to its potential predators or be directly toxic for them.

The thesis is aimed at the major components of defensive secretion of *Graphosoma lineatum* – aldehydes – as well as the whole metathoracic scent-glands secretion of *Graphosoma lineatum*. The aversive reactions of four selected predators were evaluated: (1) leopard gecko (*Eublepharis macularius*); (2) green lizard (*Lacerta viridis*); (3) great tit (*Parus major*) and (4) blue tit (*Cyanistes caeruleus*).

The following major compounds of the repellent secretion were tested: (1) the mixture of three aldehydes: (E)-hex-2-enal, (E)-oct-2-enal, (E)-dec-2-enal; (2) the mixture of three aldehydes and tridecane; (3) oxoaldehyde: (E)-4-oxohex-2-enal; (4) extracted metathoracic scent-glands secretion of *Graphosoma lineatum* adults; (5) hexane as a non-polar solvent and (6) pyrazine: 2-isobutyl-3-methoxypyrazine in experiments with leopard geckos as a positive control for excluding the effect of neophobia. All chemicals were applied on a palatable food (*Tenebrio molitor* larvae).

The aversive reactions of predators were evaluated by observing following behavioural characteristics: (1) approach latencies, (2) attack latencies, (3) approach-attack intervals and (4) attack-eating intervals towards the mealworms.

Leopard geckos exhibited aversive reactions to the mixture of three aldehydes and also to this mixture and tridecane. The mixture enriched by tridecane had even stronger aversive effect. On the other hand, oxoaldehyde did not have any aversive effect. The whole metathoracic scent-glands secretion had clearly an aversive effect on leopard geckos. Furthermore, when living specimen of *Graphosoma lineatum* was offered to leopard geckos before the trials with the mixture of three aldehydes, the impact of this mixture was enhanced thus acting as a potential signal of unpalatability.

Green lizards exhibited an aversive reaction to the mixture of three aldehydes. Tridecane reduced the aversive effect of the aldehydes mixture. Oxoaldehyde had the weakest but still significantly aversive effect on green lizards. The whole metathoracic scent-glands

secretion had clearly an aversive effect for green lizards. Moreover, when living specimen of *Graphosoma lineatum*/ *Pyrrhocoris apterus* was presented to green lizards before the trials with the mixture of three aldehydes, the effect of this mixture was enhanced hence acting as a potential signal of unpalatability.

The results of great tits and blue tits showed that both bird species had aversive reactions to the mixture of three aldehydes. On the other hand, the mixture of three aldehydes and tridecane did not have any aversive effect in case of great tits. Oxoaldehyde had strong aversive effect for great tits, whereas for blue tits this effect was delayed. The whole metathoracic scent-glands secretion of *Graphosoma lineatum* had clearly an aversive effect for both bird species. Great tits hesitated most to oxoaldehyde, while blue tits hesitated most to the whole metathoracic scent-glands secretion of *Graphosoma lineatum*.

In conclusion, aldehydes show a promise as deterrents for different types of chosen predators. The mixture of three aldehydes plays role as a strong signal of unpalatability of *Graphosoma lineatum*.

Key words: aldehyde, aversive reaction, leopard gecko, green lizard, great tit, blue tit, repellent secretion