

Abstract

By warning signalling prey advertises its unpalatability to the predators. Typical examples are true bugs (Heteroptera) combining optical and chemical signals. The aim of this study was to find out the effectiveness of chemical defence against wild-caught adults of great tits (*Parus major*) and blue tits (*Cyanistes caeruleus*) and towards hand-reared juveniles of great tits. The tested prey were adults and larvae of two invasive species of genus *Oxycarenus* (Heteroptera: *Oxycarenidae*) (aposematic *O. lavaterae*, non-aposematic *O. hyalinipennis*), adults of *Horvathiolus superbis* (Heteroptera: *Lygaeidae*) and crickets (*Gryllus assimilis*) as a control prey. We were focusing on the influence of seed bugs to the initial reaction, the learning process and to the displays of discomfort behaviour in tits. Reactions affected by the tit species, age and sex were compared in adults. Juveniles were divided into two independent experimental groups, one group was offered adults of genus *Oxycarenus*, the second was offered sunflower (*Helianthus* sp.) or *Digitalis* sp. seed fed adults of *H. superbis*. The first bug offered did not elicit an initial aversive reaction in tits, but birds reacted aversively to the bugs after having further handling experience. All juveniles, contrary to the adult tits, attacked at least one bug each and attacked and killed more bugs overall. Adult tits attacked *O. lavaterae* occurring in the Czech Republic less than *O. hyalinipennis*. Larvae of the both species were best protected and adult tits attacked them less often than adults. The Effect of host plant on chemical defence of *H. superbis* had an impact on numbers of attacks and prey survivals. *Digitalis* fed bugs were better protected against tits than sunflower fed bugs.

Key words: aposematism, multimodal signalling, host plant, Insecta, Heteroptera, *Oxycarenus*, *Horvathiolus superbis*, great tit, blue tit