



## Avoidance of ant chemical traces by spider mites\*

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Because of the strong predation pressure exerted by ants, small arthropods have developed various strategies of avoiding ant predation (Way 1963; Jennings 1971; Akino *et al.* 1999; Otsuki & Yano 2014). Spider mites become easy prey for ants when they leave their protective webs (Otsuki & Yano 2014; Adachi & Yano 2017); therefore, the ability to avoid traces of ongoing ant activity should confer a selective advantage to mites. We examined avoidance of ant traces by the spider mites *Tetranychus kanzawai* and *Tetranychus urticae*. Both mite species avoided host plant leaves with traces of *Pristomyrmex punctatus* or *Formica japonica* ants. Interestingly, *P. punctatus* depredates these mites but *F. japonica* does not. Because ant species other than *P. punctatus* also depredate spider mites (Haney *et al.* 1987; Osborne *et al.* 1995), it may be that spider mites cannot develop species-specific avoidance strategies against all predator species due to their limited cognitive ability. This hypothesis coincides with the fact that *T. urticae* avoids traces of both enemy and non-enemy predatory mite species (Grostal & Dicke 2000). We examined additional interactions using *T. kanzawai* and *F. japonica* and found that *F. japonica* trace avoidance by *T. kanzawai* seemed to be dose-dependent, and lasted for more than 72 h under some conditions. Moreover, *T. kanzawai* avoided hexane extracts of *F. japonica* traces applied to a filter paper pathway. This study represents the first demonstration of a repellent effect of ant chemical traces on spider mites. The importance of the repellent effect in ecological and applied contexts will be discussed.

**Keywords:** ant trace, spider mite, *Tetranychus kanzawai*, *Tetranychus urticae*, *Pristomyrmex punctatus*, *Formica japonica*

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