

Prey-specific contact kairomones exploited by adult and larval *Teretrius nigrescens*: A behavioural comparison across different stored-product pests and different pest substrates

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Abstract

Prostephanus truncatus is a serious exotic beetle pest of stored maize and cassava in Africa. *Teretrius nigrescens* is a classical biological control predator of this pest that was released into Africa in 1991. In previous work it was shown that adult *T. nigrescens* are arrested in the presence of dust and frass produced by *P. truncatus* feeding on maize, and both adult and larval *T. nigrescens* are arrested by solvent extracts of this dust/frass when presented on filter paper. The current study used these two complementary bioassay approaches to test crude dust/frass and then solvent extracts of the same materials. Results demonstrate that *T. nigrescens* adults are arrested more strongly by the dust/frass of *P. truncatus* than the dust/frass of six other beetle pests of stored grain. Similar behaviours are observed for responses of both adults and larvae to solvent extracts. However, extract of dust/frass from *Sitophilus zeamais* is repellent to adults and larvae of *T. nigrescens*. Collections of dust/frass from *P. truncatus* cultured on maize, cassava and an artificial maize substrate previously stripped of all hexane extractable compounds, are all shown to arrest adult *T. nigrescens* when presented in their crude form and to arrest both adults and larvae when presented as solvent extracts. These experiments demonstrate that *P. truncatus* produces a species-specific kairomone that is independent of the food or tunnelling substrate. Findings are discussed in the context of prey location, particularly in natural habitats.

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1. Introduction

Prostephanus truncatus (Horn) (Coleoptera: Bostrichidae) is a woodborer that also exploits anthropogenic habitats, particularly maize and dried cassava roots in storage (Fisher, 1950; Hodges, 1986; Rees et al., 1990). It is native to Central America (Wright, 1984) but was introduced into Africa during the late 1970s (Dunstan and Magazini, 1981; Harnisch and Krall, 1984; Kalivogui and Mück, 1991). Since its introduction, *P. truncatus* has spread relentlessly and it is anticipated that it will eventually establish in all of sub-Saharan Africa (Dick, 1990; Farrell, 2000). As part of a control programme, the

specialised predator *Teretrius nigrescens* (Lewis) (Coleoptera: Histeridae) (formerly *Teretriosoma nigrescens*; see Mazur, 1997) was first released into Africa in 1991 (Richter et al., 1998). Long-range prey location by *T. nigrescens* has been well studied and while flying it is known to be attracted to the *P. truncatus* aggregation pheromone (Rees et al., 1990; Böye et al., 1992; Helbig et al., 1992; Key et al., 1994; Scholz et al., 1998). In contrast, the complexities of short-range prey location are only beginning to be unravelled (Hodges and Dobson, 1998; Stewart-Jones et al., 2004, 2006). Understanding the cue(s) exploited and close range behavioural interactions are important aspects of *T. nigrescens* foraging biology that will contribute to the debate regarding the efficacy of *T. nigrescens* as a biological control agent (Holst and Meikle, 2003; Schneider et al., 2004).

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