



Host odours enhance the responses of adult *Rhyzopertha dominica* to male-produced aggregation pheromone

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Abstract

The behavioural responses of adult male and female *Rhyzopertha dominica* (Coleoptera, Bostrichidae) to blends of host volatiles and male-produced aggregation pheromone were observed in a four-arm airflow olfactometer. The odour sources used were five pheromone-releasing males each on a single maize grain (lower maize-volatiles blend), five pheromone-releasing males on 500 g of maize (higher maize-volatiles blend) or the host volatiles emanating from 500g of maize (maize volatiles alone). Multiple-choice tests, in which volatiles from all three odour sources were presented in the exposure chamber at the same time, were used to study odour preferences of the males and females. Both sexes showed strongest attraction to the higher maize volatile blend but there were significant sex differences in response to the odour sources. Males spent significantly more time than females in the zone with only maize volatiles, and females spent significantly more time in the higher maize-volatiles zone. However, when odour sources were offered singly, females gave numerically greater responses than males to all sources although this difference was statistically significant for only the lower maize-volatiles blend. As males are more attracted than females to host odours alone it is suggested that they may be more highly adapted to seek out new hosts while females are more inclined to locate a food source by following the pheromone signals produced by males. However, both sexes responded most strongly to the odour source comprising aggregation pheromone with the higher proportion of maize volatiles.

Introduction

Males of *Rhyzopertha dominica* (F.) and several other stored-grain insect pests release aggregation pheromone when feeding or when present on food sources (Plarre, 1998). The pheromone released by male *R. dominica* consists of two components, (S)-(+)-1-methylbutyl-(E)-2-methyl-2-pentenoate (Dominicalure-1; D1) and (S)-(+)-1-methylbutyl-(E)-2,4-dimethyl-2-pentenoate (Dominicalure-2; D2) (Khorramshahi & Burkholder, 1981; Williams et al., 1981; Cheskis et al., 1985; Liu & Lin, 1990; Razkin et al., 1996). It is generally considered that the detection of pheromone by conspecifics indicates the presence of an available food source and also, in the case of females, potential mates. Responding insects may, however, also use host odours for host

finding. Indeed, it has been suggested that *R. dominica* may be attracted over considerable distances to the odours of stored products (Barrer, 1983)

The enhancement of attraction responses to male pheromone signals by host odours is known to occur in several insects (Landolt & Phillips, 1997) and has been confirmed in studies on stored grain pests such as *Trogoderma* spp. (Barak, 1989), *Sitophilus* spp. (Trematerra & Girgenti, 1989; Phillips et al., 1993; Wakefield, 1999; Likhayo & Hodges, 2000), and *Tribolium castaneum* (Herbst) (Phillips et al., 1993). However, it is not clear whether such responses occur under natural conditions as studies have focused on mixtures of host volatiles and large amounts of synthetic pheromone. Wheat grain has been added to traps baited with the synthetic aggregation pheromone of *R. dominica* (Fields et al., 1993) but there appears