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Do competition and predation risk affect weed seed selectivity in granivorous carabid beetles?

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Abstract

Carabid beetles consume substantial amounts of weed seeds and appear to be good candidates for the biological control of weeds in arable fields. Yet, their selection criteria for certain seeds are still not clearly understood.

When foraging in-field, individuals have to deal with competition and predation exerted by conspecifics or other species of carabid beetles; they, thus, often face a trade-off between staying safe (i.e. avoiding predation or starvation) and taking the time to assess the quality of the food. We hypothesize that, in order to maximise their fitness, carabid individuals will modify their pattern of food selection (choosiness) while foraging under varying levels of risk.

To test this hypothesis, the foraging behaviour of the seed feeding carabid beetle *Harpalus affinis* was examined under 4 different experimental conditions: i) predation risk; ii) intraspecific competition; iii) interspecific competition; and, iv) control. All the risks were simulated using chemicals cues from conspecific beetles or different species of carabid beetles (predatory or granivorous).

Our results show that when foraging under a risk of predation or competition for food, *H. affinis* individuals reduced their choosiness, and that the risk of predation affected choosiness twice as much as competition. This finding suggests that *H. affinis* individuals are able to finely adjust their choosiness in response to the level of risk they face, potentially in order to maintain their food intake while reducing their exposure to risk

Keywords: predator, prey, intraspecific competition, interspecific competition, choosiness, carabid beetles

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