

## Are fitness effects of density mediated by body size? Evidence from *Drosophila* field releases

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### ABSTRACT

**Question:** Does a high larval density decrease adult field fitness by reducing body size?

**Hypothesis:** Larval density influences capture success by changing adult body size.

**Organism:** *Drosophila melanogaster* reared under different larval density conditions.

**Field site:** Eucalyptus woodland lacking soft fruit on which *Drosophila* breed.

**Methods:** Flies from different density conditions were released at a central point, and then captured on banana bait in a series of experiments. Wing size was measured as a surrogate of body size.

**Conclusion:** Capture success varied with density, but was not positively related to size in females. Females tended to be caught sooner than males and large females were caught sooner than small females when conditions were cool. Larval density influenced adult field fitness but not necessarily by affecting size.

*Keywords:* body size, capture success, density, *Drosophila*, field fitness, resource location.

### INTRODUCTION

It is well known that in insects larval crowding reduces the body size of adults. This change in adult size is thought to reflect larval competition; in fact, a reduction in the size of a strain/species when cultured together with another strain/species is commonly taken as evidence for intraspecific/interspecific competition (Denno *et al.*, 2000; Lane and Mills, 2003; Sato *et al.*, 2004; Wagner, 2005). A reduction in adult size is often equated with a decrease in adult fitness; there is particularly good evidence in insects for a direct and positive association between size and reproductive fitness when measured as female fecundity (Honek, 2003), although this is not always the case, as demonstrated for male territorial defence (Zamudio *et al.*, 1995).

However, a few studies, mainly with *Drosophila*, have suggested that larval rearing density can influence adult fitness in ways other than via adult size. High larval rearing density decreases adult mass in three species of *Drosophila*, but rearing density only affects

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