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**Association between ovipositional preferences and offspring fitness in Hessian fly  
(Diptera: (Diptera: Cecidomyiidae))**

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The Hessian fly *Mayetiola destructor* (Diptera: Cecidomyiidae) is a phytophagous insect with a short-lived, non-feeding adult stage. After mating, the adult female lives for less than a day and during this short time must find hosts for up to 400 eggs. In spite of these time constraints, females exhibit distinct preferences for particular grass genotypes and also for locations within a plant. With regard to the latter, the youngest leaf blade always receives the most eggs. The hypothesis that this preference for the youngest leaf benefits the growth and survival of offspring is addressed in this study. Movement of larvae from the site selected by the adult female was measured by restricting oviposition to the first, second or third leaf, and then checking whether larvae remained in this location for feeding. The fitness consequences of within-plant selection by the adult female and by the larva were measured by scoring survival, body size at the end of the first and second larval instars, and adult wing length. Within-plant selection behavior had important benefits for growth and survival. When the female selects the youngest leaf blade, her larvae migrate to the base of this leaf and settle immediately on the adjacent younger leaf. On the other hand, when the female selects the oldest leaf of the plant, her larvae must themselves exhibit within-plant selection behavior, continuing to move until a younger leaf is found. Spending time to find a better feeding site presumably causes a delay in feeding, with the price for this being reduced fitness. Fewer offspring survive to the adult stage and surviving adults have reduced reproductive potential.

Keywords: Hessian fly, Cecidomyiidae, Oviposition, fitness, wheat