

Pea aphid fecundity compensation in response to attractive *Pseudomonas* sp. infection *in planta*

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The interactions between bacteria, insects, and plants are complex and important aspects of the phyllosphere—the aboveground portion of plants. One agriculturally relevant interaction occurs between pea aphids and *Pseudomonas* bacteria (pseudomonads). Pea aphids are pest insects that feed on the sap of legumes, harming plants and vectoring viral diseases. Certain epiphytic (plant associated) species of the bacterial genus *Pseudomonas* are pathogenic to aphids. These pseudomonads produce compounds that emit ultra-violet (UV) florescence, which is detectable and avoided by pea aphids. However, other pathogenic *Pseudomonas* taxa attract aphids rather than deter them, creating an ecological trap. Ecological traps occur when an organism chooses an environment that is detrimental to its reproductive fitness or survival. Although previous experiments demonstrated that attraction to plants with pathogenic pseudomonads decreased aphid survival, they found no change in the total reproduction of aphids on these plants. However, these experiments did not follow individual aphids, or include the total lifetime of the aphids. Here I tracked the fecundity of individual aphids on fava bean plants sprayed with either a bacterial suspension of an attractive *Pseudomonas* strain or with a control buffer. The number of offspring were measured at two time points throughout the aphid's life. Across both time points, the average number of progeny per alate was higher on bacterial-treated plants. From two replicates, there is statistically significant evidence for fecundity compensation in response to the initial infection, and a significant increase in death as a result of prolonged infection. Fecundity compensation, where an organism increases reproduction in response to a stressor or fatal infection, has been previously shown in pea aphids. I found that this ecological trap decreased aphid survival. However, fecundity compensation may mitigate the effects that attractive pseudomonads have on overall aphid fitness. Bacterial ecological traps are an understudied phenomenon in the field of microbiology, and understanding the mechanisms by which they affect insects allows us to better utilize them in ecological and agricultural applications.