

How Will Species Respond to Climate Change? Examining the Effects of Temperature and Population Density on an Herbivorous Insect

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ABSTRACT An important challenge facing ecologists is to understand how climate change may affect species performance and species interactions. However, predicting how changes in abiotic variables associated with climate change may affect species performance also depends on the biotic context, which can mediate species responses to climatic change. We conducted a 3-yr field experiment to determine how the herbivorous grasshopper *Camnula pellucida* (Scudder) responds to manipulations of temperature and population density. Grasshopper survival and fecundity decreased with density, indicating the importance of intraspecific competition. Female fecundity tended to increase with temperature, whereas grasshopper survival exhibited a unimodal response to temperature, with highest survival at intermediate temperatures. Grasshopper performance responses to temperature also depended on density. Peak survival in the low-density treatment occurred in warmer conditions than for the high-density treatment, indicating that the intensity of intraspecific competition varies with temperature. Our data show that changes to the temperature regimen can alter grasshopper performance and determine the intensity of intraspecific competition. However, the effects of temperature on grasshopper performance varied with density. Our data indicate the importance of the biotic context in mediating species responses to climatic factors associated with global change.

KEY WORDS temperature, grasshoppers, density dependence, intraspecific competition, metabolism
