PROJECT TITLE: Investigating the link between nutrition and winter fitness in a beneficial biological control insect

Project Supervisor: Dr Lucy Alford, School of Biological Sciences, Faculty of Life Sciences, University of Bristol.

Co-Supervisor: Professor Richard Wall, School of Biological Sciences, Faculty of Life Sciences, University of Bristol.

Project Enquiries: (email address required): lucy.alford@bristol.ac.uk

Project keywords: (provide as required): conservation biological control, conservation ecology, ecosystem services, thermal tolerance, stress tolerance.

Proposed start date: 26th June 2023

Project description:

During winter months, insects are faced with challenging cold temperatures. To survive these conditions, some insects enter a cold-tolerant diapause state. However, climate change is leading to warming winters in temperate regions, and, as a consequence, many beneficial insects are no longer entering into a winter diapause and are instead remaining winter-active. Increased winter activity will render insects vulnerable to challenging cold temperatures during a time when food sources such as nectar and pollen are scarce, with implications for the ecosystem services provided by beneficial insects. Cold stress is costly to the individual and, for this reason, nutrition plays a vital role in an individual’s fitness and thus its ability to survive unfavourable temperatures. Consequently, supplementary feeding may enhance the fitness, thermal tolerance and ultimately the winter survival of beneficial insects. In agricultural landscapes this may be achieved via plant diversification schemes with a focus on winter flowering species to provide beneficial flower-visiting insects with a source of nectar and pollen, as well as overwintering and nesting sites, during the unfavourable winter months.

One insect increasingly winter-active is the parasitoid wasp and biological control agent *Aphidius ervi*; a beneficial insect involved in the biological control of aphid pests. Utilising *A. ervi* as the study organism, the study will investigate the effect of supplementary feeding in the form of winter flowering species commonly employed as winter cover crops, on the thermal tolerance of the parasitoid wasp and other life history parameters integral to its efficacy as a biological control agent. Ultimately this research will contribute towards the development of targeted multifunctional flower strips to support beneficial insect biodiversity including pest control agents in agricultural landscapes and enhance the vital ecosystem services they provide in a changing climate.

Candidate requirements

An interest in insect stress physiology and applied ecology. Training in laboratory measures of thermal tolerance and insect maintenance will be provided and thus prior experience is not a prerequisite.
Background reading and references


