

Specialisation of a leaf-feeding beetle is explained by phylogeny and specific resistance traits of its host plants

Michael Cripps *¹, Sarah Jackman ¹, Michael Rostás ², Cristina Roquet ³, Alfonso Susanna ⁴, Graeme Bourdôt ¹

¹ AgResearch Ltd., Lincoln, Private Bag 4749, Christchurch 8140, New Zealand

² Bio-Protection Research Centre, Lincoln University, Lincoln 7647, New Zealand

³ Laboratoire d'Écologie Alpine, Université Joseph Fourier, Grenoble Cedex 9, France

⁴ Institut Botànic de Barcelona, Pg. del Migdia s.n., E-08038 Barcelona, Spain

The majority of phytophagous insects are specialised feeders restricted to a plant family, genus, or species. The evolution of specialised insect-plant interactions is generally considered to be a result of trade-offs in fitness on a range of possible hosts. An important selection pressure resulting in specialisation is the resistance properties of host plants. We tested the survival (naive 1st instar to adult) of the oligophagous leaf-feeding beetle, *Cassida rubiginosa*, on 16 selected representatives of the Cardueae tribe (thistles and knapweeds). Putative resistance traits were measured and the phylogenetic signal of the traits were examined, and related to the survival of the beetle. In addition, the influence of specific resistance traits of closely related congeneric thistle species were tested by experimental manipulation and showed that differences in beetle survival were explained by a common physical resistance trait that varied in magnitude. By elucidating the plant traits that explain insect fitness in a phylogenetic context, we might better understand the evolutionary processes of specialisation, and the proximate mechanisms determining host-plant utilization.

