

Weather modulates spider trophic interactions: the interactive effects of prey community structure, adaptive web building and prey choice

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Abstract

1. Generalist invertebrate predators are sensitive to weather conditions, but the relationship between their trophic interactions and weather is poorly understood. This study investigates how weather affects the identity and frequency of spider trophic interactions as mediated by prey community structure, web characteristics and density-independent prey choice. 2. Spiders and their locally available prey were collected from barley fields in Wales, UK from April to September 2017-2018. The gut contents of 300 spiders were screened using DNA metabarcoding, analysed via multivariate models, and compared against prey availability using null models. 3. Spiders' trophic interactions changed over time and with weather conditions, primarily related to concomitant changes in their prey communities. Spiders did, however, appear to mitigate the effects of structural changes in prey communities through changing prey preferences according to prevailing weather conditions, possibly facilitated by adaptive web construction. 4. Using these findings, we demonstrate that prey choice data collected under different weather conditions can be used to refine inter-annual predictions of spider trophic interactions, although prey abundance was secondary to diversity in driving the diet of these spiders. By improving our understanding of the interaction between trophic interactions and weather, we can better predict how ecological networks are likely to change in response to variation in weather conditions and, more urgently, global climate change.

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