Meta-analysis reveals intraspecific variation in herbivores for plant-mediated interactions


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Introduction

When herbivores attack a plant, they induce changes in plant traits, which affect other herbivores on the same plant. Such ‘plant-mediated interactions’ among herbivores are important drivers of community dynamics (Shan et al. 2014).

Selection among herbivore populations can produce intraspecific variation for plant-mediated interactions with other herbivores. However, few studies assess this variability, which is what we did here, using plant-mediated interactions between two spider mite species on tomato host plants. We ask: Why do what extent do the spider mites Tetranychus evansi and Tetranychus urticae affect the performance of other spider mites through plant-mediated effects? What factors contribute to variation in the strength of the interaction?

Materials & Methods

We found 38 datasets where intact tomato plants were infested with either T. evansi or T. urticae (Step 1), and oviposition rates of other T. evansi or T. urticae populations were measured on the same leaflet (Step 3). For each dataset we calculated the standardized mean difference in oviposition rates per plant of adult females between:

A. T. evansi-infested plants and clean control plants

B. T. urticae-infested plants and clean control plants

We used these effect sizes (std mean difference) as input for random-effects meta-analysis.

Discussion

The reduction in effect size over time can be explained by loss of function due to selection against plant defense induction and suppression in lab cultures, or due to mutation accumulation as a result of random genetic processes.

This case of ‘inadvertent selection’ in lab cultures demonstrates intraspecific variation in herbivores for plant-mediated effects on other herbivores, and suggests a change in inheritable variation for these interactions over time.