Diversity and community composition of herbivorous thrips vary along environmental gradients, but plant effects remain an important driver

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Abstract

Elevational gradients are a powerful tool to explore how species communities respond to changes in environmental conditions along short geographic distances. It is usually observed that species diversity decrease monotonically with elevation, or follow a mid-elevation peak. These effects, however, may vary among taxa and geographic regions. Changes driven by elevation may also depend on landscape characteristics like habitat heterogeneity and patchiness, but also on seasonal variations such as those occurring between cold and hot seasons. Here, we used as biological model thrips (Insecta: Thysanoptera), which is a diverse group of slender insects, to investigate the drivers of insect diversity and of community composition along elevational gradients in Reunion Island. We sampled thrips on 106 plant species belonging to 44 families along seven replicated elevated gradients from 0 to 1,600 m in both summer and winter conditions. We identified 4,278 specimens representing 41 species and we estimated their diversity both at the local (alpha) and at the compositional (beta) diversity level. These metrics were related with elevation, and with landscape characteristics around each site, which included habitat diversity and patchiness (or fragmentation). We found that different thrips communities are directly related to host plants: invasive plants hosted a large diversity of thrips, whereas some endemic ones hosted unique communities. Elevation, patchiness and season were variables with an evident effect on both alpha and beta diversity. Beta diversity revealed that diversity of thrips was larger at low elevations, and this change was mostly dominated by richness differences (i.e. low elevation sites had more unique species than high elevation ones). Our results show that important diversity patterns can be appreciated through the lens of beta diversity, and may help to understand how regional pools of insects are distributed in relationship with topography, landscape and climatic conditions.

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