Environment, but not phylogeny, drives herbivory and leaf attributes in trees from two contrasting forest formations of the Brazilian Atlantic Forest.

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Abstract

Phylogeny, as well as the environment and leaf quality, can influence herbivory in plants. Plants with nutrient and water-rich leaves are generally more attacked by herbivores, and phylogenetically related plants tend to display similar leaf attributes. The aims of this study were to (1) compare the herbivory and leaf attributes of shrub-tree species from a rain forest (RF) and a coastal forest (*Restinga* Forest, REST); (2) verify possible relationships between herbivory and leaf attributes; and (3) determine whether environmental factors or phylogeny explain differences in herbivory and leaf attributes. The study was carried out in an Atlantic rain forest fragment (RF) and in a Restinga forest (REST) in Rio de Janeiro, Brazil. Herbivory and leaf attribute analyses were carried out on ten congeneric plant pairs from both studied areas. Mean foliar herbivory was significantly higher at RF ($7.2 \pm 0.24\%$) compared to REST ($3.2\% \pm 0.9$). Among leaf attributes, the C/N ratio was negatively correlated with herbivory, while N was positively correlated. A principal component analysis revealed that the co-occurring congeneric pairs from both areas formed two distinct groups, with RF species presenting mainly higher N concentrations and water content, while REST species presented mainly higher total phenol and C concentrations, as well as dry mass per foliar unit area (LMA). The variances observed among the congeneric pairs for eight of the eleven attributes evaluated herein were explained by the environment, while only four of the eight also had their variances explained by phylogeny. Phylogeny alone explained the observed variance for only one attribute (Mg concentrations). Thus, the results suggest that environment has a significantly higher influence on the herbivory and leaf attribute patterns of the studied areas compared to phylogeny.

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