Reproductive traits of woody plants as a tool for functional ecology: analysis of variability and potential

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Abstract

Plant functional traits are tools in functional ecology that enable the development of models concerning the current and future functioning of ecosystems. In the context of ongoing climate change, such predictions are essential. However, many studies to date have been based on the concept of the plant economics spectrum, which primarily considers leaf and shoot traits. Recently, more researchers have been advocating for the inclusion of traits representing all plant organs to better understand species and ecosystem functioning. This study aspires to fill this gap.

The aims of the study were (1) to analyze the variability of selected floral and fruit traits at both interspecific and intraspecimen levels, and (2) to determine the potential of these traits for functional ecology. We hypothesized that: (H1) reproductive traits will be strongly correlated with phylogeny, (H2) reproductive traits will show less intraspecimen variability than interspecific variability, (H3) reproductive traits will have lower intraspecimen and interspecific variability than traits related to resource availability, commonly used in ecology, and (H4) reproductive traits will be correlated with other commonly used traits representing the global spectrum of plant form and function.

The study found a statistically significant correlation between floral size traits, as well as some chemical traits, with the evolutionary history of species (H1). Additionally, there is considerable interspecific variability in the studied floral and fruit traits, indicating a wide range of reproductive strategies among the species studied. Light availability has a low impact on the intraspecimen variability of the studied floral and fruit traits (H2). The ratio of intraspecimen to interspecific variability depends more on the specificity of the analyzed trait than on whether or not it is a reproductive trait (H3). The analyzed floral and fruit traits complement the global spectrum of plant form and function and are consistent with traits representing other plant organs (H4).

The results highlight the significant potential of floral and fruit traits for further research in functional ecology. The correlations with phylogeny, as well as the high interspecific variability alongside the strong stability of traits at the intraspecimen level, suggest that extrapolation of these trait measurements to other individuals of a given

species is justified for many types of ecological research. The strong consistency of floral and fruit traits with commonly used traits of other organs encourages further studies aimed at fully understanding the diversity of forms and functions of species, with a particular focus on their reproductive strategies.