



THE IMPORTANCE OF ORDER AND ARRIVAL TIME IN THE PRIORITY EFFECT: A REVIEW OF AQUATIC AND TERRESTRIAL PLANTS

Bruna Heloisa Moreira PARPINELLI¹, Fernanda Moreira FLORENCIO¹, Aline 6 ROSADO¹, Sidinei Magela THOMAZ¹

¹ Graduate Program in Ecology of Inland Water Ecosystems, Department of Biology, State University of Maringá, Maringá, Paraná, Brazil

E-mail: brunamparpinelli@gmail.com

The order and timing of species arrival during colonization can strongly influence community assembly through priority effects. Early-arriving species may alter the establishment, growth, and reproduction of later-arriving species, shaping community structure, invasion success, and restoration outcomes. This review evaluated how priority effects have been investigated using experimental and observational approaches across terrestrial and aquatic environments. We conducted a systematic literature review of studies from the Web of Science (908 records) and Scopus (1006 records) databases. Priority effects were observed across multiple temporal scales, but their strength varied among ecological contexts and species origins. Early native species establishment may suppress non-native species. However, when early arrival of native and non-native species was compared using the same set of species, non-natives showed greater advantages, expressing stronger priority effects. This pattern reinforces the expected negative effects of early non-native establishment, which may increase invasion success and hinder native species establishment. Most studies, however, have been conducted in terrestrial ecosystems (58 experimental and 14 observational studies), while aquatic plant communities remain comparatively understudied (7 experimental and 1 observational study). In terrestrial ecosystems, early-arriving species often reduce resource availability through pre-emption, limiting the establishment of later species. In aquatic environments, priority effects may operate through mechanisms distinct from those described in terrestrial ecosystems, as hydrological processes such as water flow may redistribute resources and weaken resource pre-emption. Expanding research on aquatic plant colonization is therefore essential to understand how environmental conditions mediate priority effects and influence community assembly and invasion dynamics in aquatic ecosystems.

Palavras-chave: *colonization; community assembly; environmental conditions; establishment; invasion.*