Experimental test of coexistence and ecosystem functioning in natural microcosm

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Human activities are known to have major effects on the environment at multiple scales. These impacts lead to countless changes in the biotic structure and composition of ecosystems, which then translates into loss of species richness and diversity. To counteract this loss, the study of species diversity and how to best maintain it has become a key focus of many ecologists worldwide. One of the solutions proposed by scientists is to better understand the mechanisms leading to coexistence between species in naturally diverse communities. By using the model aquatic system within the pitcher plant *Sarracenia purpurea*, we attempted to bridge the gap between the theoretical work done on coexistence and the importance that coexistence has for ecosystem functioning in natural communities of differing diversity levels. Under laboratory conditions, we manipulated the complexity of the inquiline community through dilution as well as the addition of one of five colonizer species that are known to coexist with the community. Following univariate analyses and structural equation modeling (SEM), we found the surprising result that colonizer success was positively correlated not only with dilution but also with protist species richness of the resident community. These results are not in line with general invasion theory and the ideas of biotic resistance and niche theory, which predict that invasion success decreases with species richness. We believe these observations to be the result of coexistence between species which have coevolved over numerous generations. Our results could play a key role in conservation programs emphasizing the importance of migration corridor, as they suggest that enhancing the success of reintroducing a species into a community depends on the species richness in the receiving communities.

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