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Ecosystem engineers modulate exotic invasions in riparian plant communities

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The relationship between biodiversity and invasibility of exotic plant species within different environments and at different spatial scales is still being discussed amongst scientists. In this study, patterns of native and exotic plant species richness and cover were examined in relation with ecosystem engineer effects of pioneer vegetation within the active tract of the Mediterranean gravel bed river Tech, South France. The floristic composition was characterized according to two distinct vegetation types corresponding to two habitats with contrasted conditions: (i) open and exposed alluvial bars dominated by herbaceous communities and (ii) islands and river margins partly stabilized by ecosystem engineer plants, disconnected from annual hydrogeomorphic disturbances, and covered by woody vegetation. A significant positive correlation between exotic and native plant species richness and cover was observed for the herbaceous and the woody types, indicating that both native and exotic richness benefit from the prevailing environmental conditions. However, significant differences in native and exotic specific richness and cover were found between these two vegetation types. Higher values of total species richness and Shannon diversity of native and exotic species were attained within the herbaceous vegetation type compared to the woody type. These differences may be related to changes in local exposure to hydrogeomorphic disturbances driven by engineer plant species, and to vegetation succession. A lower exotic cover within the woody vegetation type compared to the herbaceous type suggested an increase of resistance to invasion by exotic species during the biogeomorphic succession. The engineer effects of woody vegetation resulted in a decrease of alpha (α) diversity at patch scale but, in parallel, caused an increase in gamma (γ) diversity at the scale of the studied river segment. Our study corroborates recent investigations that support the theory of biotic acceptance of exotic species by native species at the local scale within heterogeneous and disturbed environments.