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Talk                      Using plant traits for the recovery of ecosystem functions and services: Trait-based ecosystem engineering?

## **Discriminating resident and invasive functional community responses to invasion and invasive removal**

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Invasion effects on the functional structure of communities depend on the abundance and traits of both invasive and resident species. However, no consensus exists whether invasive species should be included or excluded in the computation of community responses. We offer a simple partitioning method to discriminate resident and invasive community components of the functional structure, which we apply to evaluate *Eragrostis plana* invasion and the recovery of grassland communities after its removal. Partitioning was based on 0 or 1 weights attributed to invasive and resident community species in the formulae of Rao functional diversity and community weighted means (CWMs). We used data of a four-year invasive removal, randomized experiment comparing invaded, non-invaded and invasive species removal communities in southern Brazilian native grassland.

Permanent plots located in an invaded grassland were subjected to invasive species removal treatments: clipping, herbicide, hand-pulling and no-removal. Plots located in an adjacent non-invaded area were also monitored. Annual vegetation surveys before and during four years of removals assessed temporal changes in community's functional structure, which we partitioned into resident and invasive components. We calculated fuzzy-weighted composition, functional diversity and CWMs. *E. plana* invasion turned communities less functionally diverse, by affecting resident species composition (resident component) and by adding new trait values (invasive component). *E. plana* was associated to higher values of dry mass per area and leaf dry-matter content. Encouraging, removals turned communities functionally similar to non-invaded references, and different from invaded communities, which was particularly noticeable for hand-pulling removal that enhanced resident component contribution. In manipulative experiments, the invasive species is commonly excluded from the computation of community responses to avoid circularity, as the experiment may involve a direct manipulation of the invasive species. However, resident communities after invasion may not correspond to non-invaded communities, as invasive species could already have shifted the identity and abundance of resident species, by modifying its functional trait diversity and composition. Thus, considering that the invasive species is part of the community in some treatments, it is essential to consider invaded communities as the result of both resident and invasive additive components. The additive partitioning of functional structure descriptors into resident and invasive species components can help disentangling the relative contribution of each component to community response to invasion.