Rainfall and functional traits shape restoration success in dry forest of Reunion island

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Abstract

Tropical dry forests belong to the most endangered habitats worldwide, due to habitat degradation. In the Mascarenes islands, however human settlement is relatively recent (˜ less than 400 y. o.), native dry forests only remain as fragments among the three islands of the archipelago. On Reunion island, only a percent of the original surface still remains in remote locations. Since 2009, the National Park of Reunion has started restoration works in the north of the island. Around 400 000 seedlings of 45 dry-forest species were planted and their survival and growth have been followed from 2012 to 2018. Environmental parameters as shadowing and rainfall were registered respectively at the start and from 2012 to 2018. In 2018, we sampled and complete a database with functional foliar traits for each species on the field.

Our results show that environmental changes during the plantation had an impact on the survival of seedlings and on their relative growth. In particular, amounts of rainfall during the dry seasons might act as a major determinant of survival through years. Globally survival and growth were higher for some species according to their succession group. However some species categorized as slow-growers and shadow-tolerant were surprisingly similar to "pioneers" species. Functional traits as SLA and LDMC content explain a large part of survival and growth observed.

Those results highlight the use of studying functional traits in restorative works and in restoration ecology. Selecting species based on their succession group is limited, because these groups are mainly made on experts opinions. Functional traits offer an easy and objective way to guide restoration nowadays and should be the first exploratory step of any restorative program. At local and regional scale, this study gave tools for dry forest restoration in particular but also for any restorative program of native habitats.

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