

## **Identifying plant traits: a key aspect for suitable species selection in ecological restoration of semiarid slopes**

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In the context of ecological restoration, one of the greatest challenges for practitioners and scientists is to select suitable species for revegetation purposes. In semiarid environments where restoration projects often fail, little attention has been paid so far to the contribution of plant traits to species success.

The objective of this study was to (1) identify plant traits associated with species success on four roadside situations along an erosion-productivity gradient, and (2) to provide an ecological framework for selecting suitable species on the basis of their morphological and functional traits, applied to semiarid environments.

We analyzed the association of 10 different plant traits with species success of 296 species surveyed on the four roadside situations in a semiarid region (Valencia, Spain). Plant traits included general plant traits (longevity, woodiness) and more specific root-, seed- and leaf-related traits (root type, sprouting ability, seed mucilage, seed mass, seed susceptibility to removal, specific leaf area and leaf dry matter content). All of them were selected according to the prevailing limiting ecogeomorphological processes acting along the erosion-productivity gradient.

We observed strong shifts along the erosion-productivity gradient in the traits associated to species success. At the harshest end of the gradient, the most intensely eroded and driest one, species success was mainly associated to seed resistance to removal by runoff and to resistance to drought. At the opposite end of the gradient, the most productive one, species success was associated to a competitive-ruderal plant strategy (herbaceous successful species with high specific leaf area and low leaf dry matter content).

Our study provides an ecologically-based approach for selecting suitable native species on the basis of their morphological and functional traits and supports a differential trait-based selection of species as regards roadslope type and aspect.

In conclusion, these new insights from basic ecology and practical management guidance represent a great opportunity for practitioners to move forward with the success of roadslope restoration in semiarid environments.