



Topographic thresholds for plant colonisation on semiarid eroded slopes.

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In severely eroded areas, plant colonisation on steep slopes is limited by the action of strong erosive forces that interact with plants at early stages of plant establishment. The objective of this study was to understand the mechanism that controls spontaneous plant colonisation on highly eroded slopes in a semiarid badland area of East Spain by (i) determining topographic thresholds for plant colonisation, (ii) identifying the soil properties limiting to plant establishment and (iii) assessing whether colonising species have specific plant traits to cope with those limitations.

We used slope angle and aspect as surrogates of erosion rate and water availability respectively. Since soil erosion and water availability can limit plant establishment and both interact in the landscape, we analysed variations in colonisation success with slope angle, as a function of slope aspect. Vegetation success was measured in terms of total vegetation cover and number of species in 156 different slopes. After determining slope angle thresholds, soil was sampled near the threshold values for soil analysis (nitrogen, phosphorous and CaCO₃ contents and water holding capacity). Plant traits related to plant colonising capacity were analysed both in the pool of species colonising the steep slopes just below the threshold values and in the pool of species inhabiting the gentler slopes and absent from the steeper slopes just below the threshold.

The identified slope angle threshold values for plant colonisation clearly decreased from North to South. No differences existed in soil properties neither among slope aspects at the slope angle threshold values nor between slope positions (just below and above the threshold) within slope aspect classes. This suggests that variations in the slope angle threshold between slope aspect classes result from differences in the colonising capacity of plants controlled by water availability. Long-distance dispersal, mucilage production and specific leaf area proved to be preferably associated with the pool of colonising species. These results may be useful in the perspective a more efficient ecological restoration of severely eroded semiarid ecosystems.