
Differentiation among populations of *Brachypodium retusum*: Consequences for the restoration of Mediterranean steppes.

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Abstract

The ecological restoration of Mediterranean steppes is a slow process because several key species of their plant communities are poor colonisers. In the plain of "La Crau" (South-Eastern France), *Brachypodium retusum* (Pers.) P.Beauv. is such a key species. Although dominant in the traditionally grazed steppe system, its seedling recruitment is very low. In order to evaluate the efficiency of reintroduction by sowing, population differentiation and adaptation were tested in lab and common garden experiments. Sixteen populations were collected at a regional scale. Collection sites differ in grazing intensity, climate and soil conditions. *B. retusum* occurs on two distinct soil types, calcareous and base-poor red Mediterranean soils. Structured sampling including close-by pairs (10 km) of these soil types collected at different distances was used to analyse the spatial structure of population differentiation. Different humidity levels were also applied in a germination experiment testing for adaptation to this factor. Significant differences between populations were found in all studied traits. Soil type had a significant effect on germination but not on growth. Site of origin explained population differentiation better than soil of origin suggesting an influence of climate. However, adaptation to humidity was weak in germination tests. Surprisingly high germination and seedling survival indicated that restoration by sowing may be successful under favourable recruitment conditions.

Keywords: *Brachypodium retusum*, Mediterranean steppe, population differentiation, ecological restoration

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