
Do good neighbors compensate for bad climate? The effect of density, evolutionary neighborhood and fungi on vulnerability of seedlings to climatic stress

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Abstract

Climate changes and becomes in much of Europe warmer and drier. As a result, tree species such as oaks (*Quercus petraea*) risk to strongly decline. The classic strategy of foresters is to change seed provenances and to choose genotypes coming from warmer or drier provenances and likely being adapted to warm and dry climates. However, this strategy results in the loss of local genotypes and it does not account for non-climatic constraints of trees, such as the impact of tree neighbors or of natural enemies. We focus here on oaks (*Quercus petraea*) and their most vulnerable stage, seedlings. We studied germination, survival, growth and budburst of seedlings within a natural mosaic of soil microclimates and manipulated the biotic neighborhood: the distance of seeds / seedlings to adult oaks, the species identity of these oaks, the evolutionary distance of the ambient canopy, the density of seeds / seedlings and the presence of pathogenic fungi. We test whether the response of seedlings to soil-climatic constraints depends on the biotic neighborhood. Tentative results suggest that germination and first year growth of seedlings show particularly strong relationships to neighborhood, environment and their interaction. Specifically, seedlings develop better in moist soils and under an evolutionarily distant canopy and such a canopy in addition reduces the negative impact of dry soils. Overall, the impact of climate change on regeneration of a major forest tree-species might be mitigated by changing the evolutionary neighborhood in which this regeneration takes place.

Keywords: density, dependence, forest, germination, natural enemies, oak, performance, phylogenetic distance, *Quercus*, regeneration, seedlings, species community

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