
Effects of a nitrogen fixing shrub introduced as a fertilizer for maritime pine forestry in the south-west of France.

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Abstract

Nitrogen fixing species are a well-known leverage for increasing the soil fertility in agriculture. Nevertheless they are uncommonly used in forest ecosystems. The "Landes de Gascogne" forest (SW France) has soil fertility issues and *Ulex europaeus* – a very vigorous species also known as *common gorse* – is native from this region. For these reasons, this forest is a suitable ecosystem for trials associating trees dedicated to wood production and N-fixing understory species.

The forestry itinerary developed here distinguishes two main periods separated by the whole gorse population crushing. This trial is in a relatively rich site of the forest. Firstly, when gorse individuals grew and became a dense stand, pine mortality increased during dry season, underlying competition for water. Meanwhile, growth was affected too, but only in diameter, indicating a pine stem elongation to avoid light competition induced by gorses. Pine morphological traits were rather badly affected regarding to straightness and verticality. However, a natural pine pruning effect was enhanced in the presence of a dense gorse stand.

Gorse stand was crushed after five years. Quickly afterward, we measured a nitrogen needle enrichment reflecting a fertilizing effect of gorse remnants. Crushing also made pine free from shrub competition and a "catch-up growth" was identified regarding diameter. Two years after the gorse crushing, tree size and biomass were similar among experimental treatments that included –or not– gorse.

In conclusion, during the eight first years of this study, gorse introduction in pine tree forestry appeared to have mixed effects: gorse induced competition. On the other hand, gorse led to high input in nitrogen into the ecosystem with positive effects on tree nutritional status. Therefore, it is necessary to continue the assessment of the pine-gorse association in the "Landes de Gascogne", for higher time scales and on poorer sites.

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