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Survivorship of plant species from soil seedbank after translocation from subtropical natural forests to plantation forests

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Highlights

- Large amounts of seedlings emerged from the natural soil seedbank at the start.
- Seven tree and two shrub species of natural soil seedbank survived in plantations.
- Soil nitrogen of natural forest and plantation significantly affect seedling growth.
- Soil seedbank translocation can be a useful approach for plantation regeneration.

Abstract

The enhancement of biodiversity is an important strategy to improve the structure and functioning of monoculture plantations. However, compared with seedling transplanting, there is limited information about the utilization of soil seedbanks in regenerating plantation forests. In the present study, to investigate the potential application of soil seedbanks in plantation forest regeneration, the topsoil (0–10 cm) of natural forests was translocated to different monoculture plantations, namely, *Acacia crassicarpa*, *Castanopsis hystrix* and *Eucalyptus urophylla* monocultures. Seed germination, seedling growth and related environmental conditions of the plantation forests were monitored in the experiment. Although, at the very start, large numbers of seedlings emerged from the soil seedbank, only nine species survived after 2.5 years, including seven tree species and two shrub species. Notably, *Machilus chekiangensis*, a tree species with high economic value, was established in the plantation forests. Except for the common species that emerged in the three plantations, there were some special species that were only associated with a specific plantation. Redundancy analysis revealed that nitrogen from both the natural forest and plantation forest soil had significant effects on seedlings growth. However, environmental conditions such as light (reflected by leaf area index), soil temperature, moisture and pH showed no obvious influence on seedling growth. Our study suggests that soil seedbank translocation from a natural forest to a plantation forest can be a useful approach for plantation forest regeneration because it could introduce valuable plant species and improve the plant biodiversity.

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Keywords

Soil seedbank; Natural forest; Plantation forest; Soil translocation; Forest regeneration

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