# Modelling survival and growth of high-value timber species planted in log yards of selectively logged forests

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## 1 Introduction

Planting high-value timber species in logged forests can sustain long-term wood supply. Former log yards (Fig. 1) could serve as planting sites, but heavy vehicle traffic and log storage often compact soils, raising concerns for seedlings survival and growth.

We assessed the survival and growth of native high-value timber species planted in abandoned log yards in south-east Cameroon. We tested whether: soil ripping with bulldozer claws (down to 40 cm) and, log yards size improves seedlings performance.


**Figure 1. Log yard after logging, which will subsequently be planted with seedlings of high-value tree species.**

## 2 Methods

We planted 4,453 seedlings of 11 native timber species (*Afzelia bipindensis*, *Baillonella toxisperma*, *Entandrophragma angolense*, *Entandrophragma cylindricum*, *Entandrophragma utile*, *Erythrophleum suaveolens*, *Mansonia altissima*, *Pericopsis elata*, *Pterocarpus soyauxii*, *Terminalia superba* and *Triplochiton scleroxylon*) in 147 log yards across two FSC-certified forest concessions in southeast Cameroon (Fig. 2).

Seedlings were monitored for 1–6 years. Using linear mixed-effects models, we evaluated the effects of species, time since planting, soil ripping, and log yard area on survival and growth.

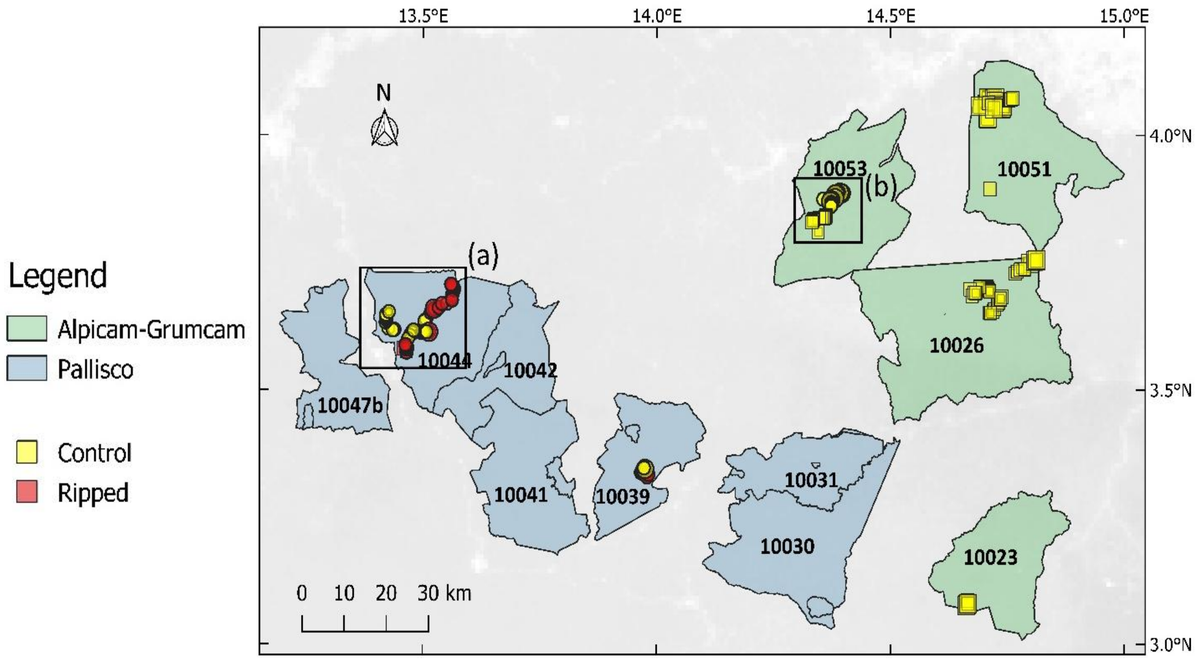


**Figure 2. Location of the log yards studied. The numbered areas indicate the forest management units.**

## 3 Results and implications for practice

Annual survival rates varied among species and periods.

- Average survival was 83% in the first period (1-2 years) and increased to 94% in the second (3-6 years).
- Seven species maintained >80% survival across both periods (Fig. 3).
- Survival did not vary with soil ripping or log yards size (108-990 m²).

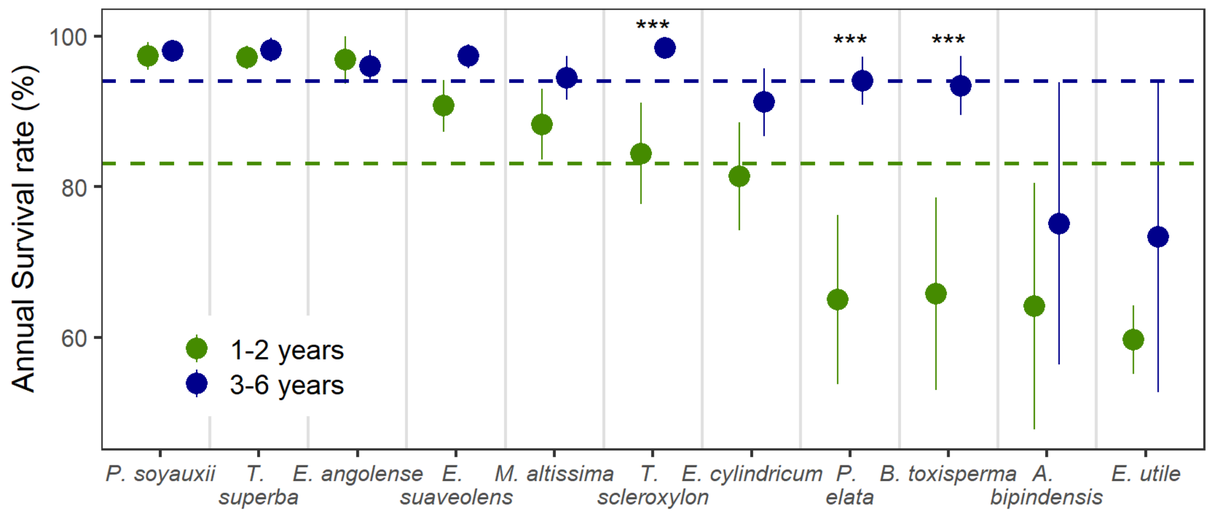


**Figure 3. Mean annual survival rate of species across two monitoring periods. Line colors indicate monitoring time since planting.**

Diameter and height increments varied by species and periods.

- The fastest diameter growth species were *T. superba* (21 mm.yr$^{-1}$) and *P. soyauxii* (12 mm.yr$^{-1}$) (Fig. 4).
- Log yard size had no effect on sapling growth (Fig. 5).
- Soil ripping influenced a few species: *T. superba* grew faster in ripped yards, while *B. toxisperma* grew slower.

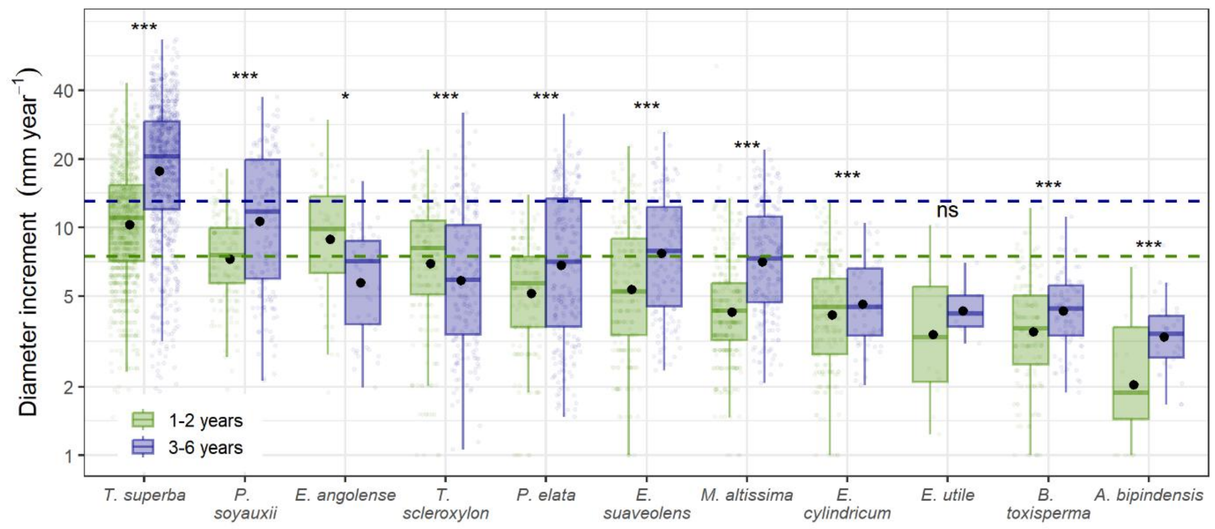


**Figure 4. Species diameter increments in log yards across monitoring periods (*y*-axis log scale). Line colors indicate mean values per period.**

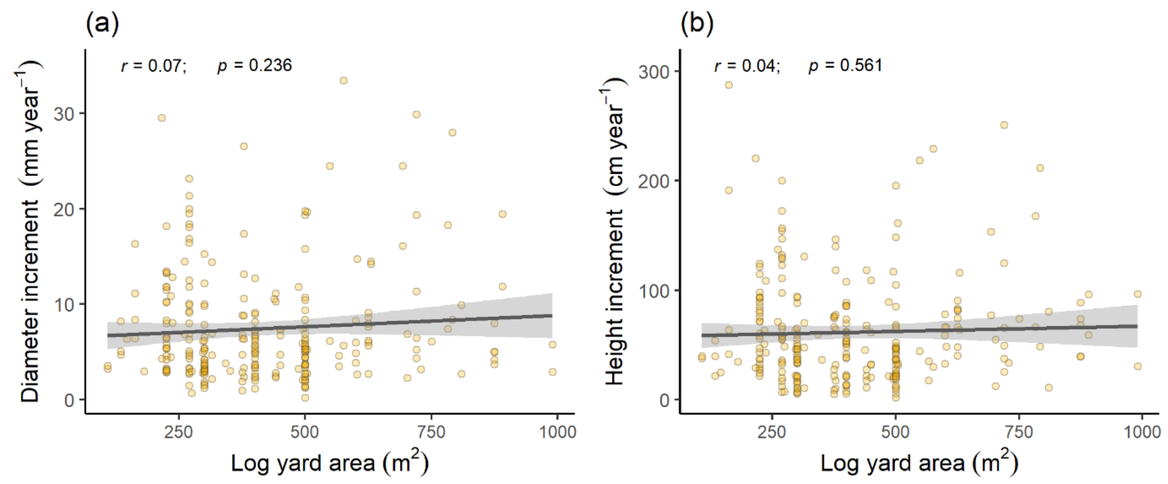


**Figure 5. Relationships between log yard area and the increments in (a) diameter and (b) height.**

We recommend planting fast-growing species on former log yards in southern Cameroon. Since ripping had no benefit on survival and only minimal impact on growth, despite its high cost, investing in treatments like clearing competing vegetation is a more effective.

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