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RESEARCH AND PRACTICE
IN FOREST ECOLOGY
INTERNATIONAL CONFERENCE

Performances of native tree species in plantations: a synthesis for the Guineo-Congolian region

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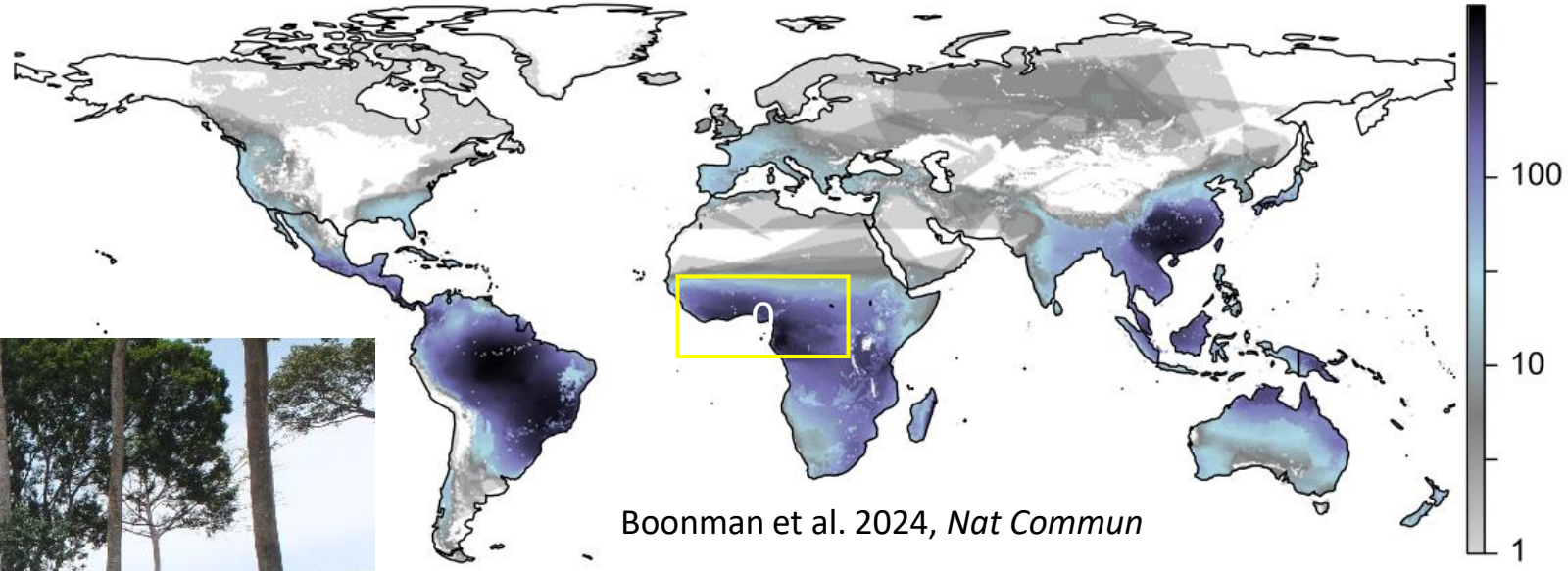
Context

Many tree species are exposed to high rates of recent change

Global changes affect countries around the world differently



Boonman et al. 2024, *Nat Commun*

The risk is higher in the tropics

African tropical forests contain many degraded areas

Context

Planting is one of the solutions to cope with global change

Several tree planting initiatives have been launched in Africa in recent years, with different targets for each country

Since colonial times planting trials have been carried out. The results of these experiments remained scattered, hampering our ability to identify the key drivers of variability in survival and growth of native tree species.

What can we learn from previous research in the Guineo-Congolian region ?

Objectives

- To synthesize the survival and growth performance of native tree species planted in moist forests of the Guineo-Congolian region

- To test whether the performance metrics depended on environmental conditions, planting methods and species traits

Methods

Review

Meta-analysis

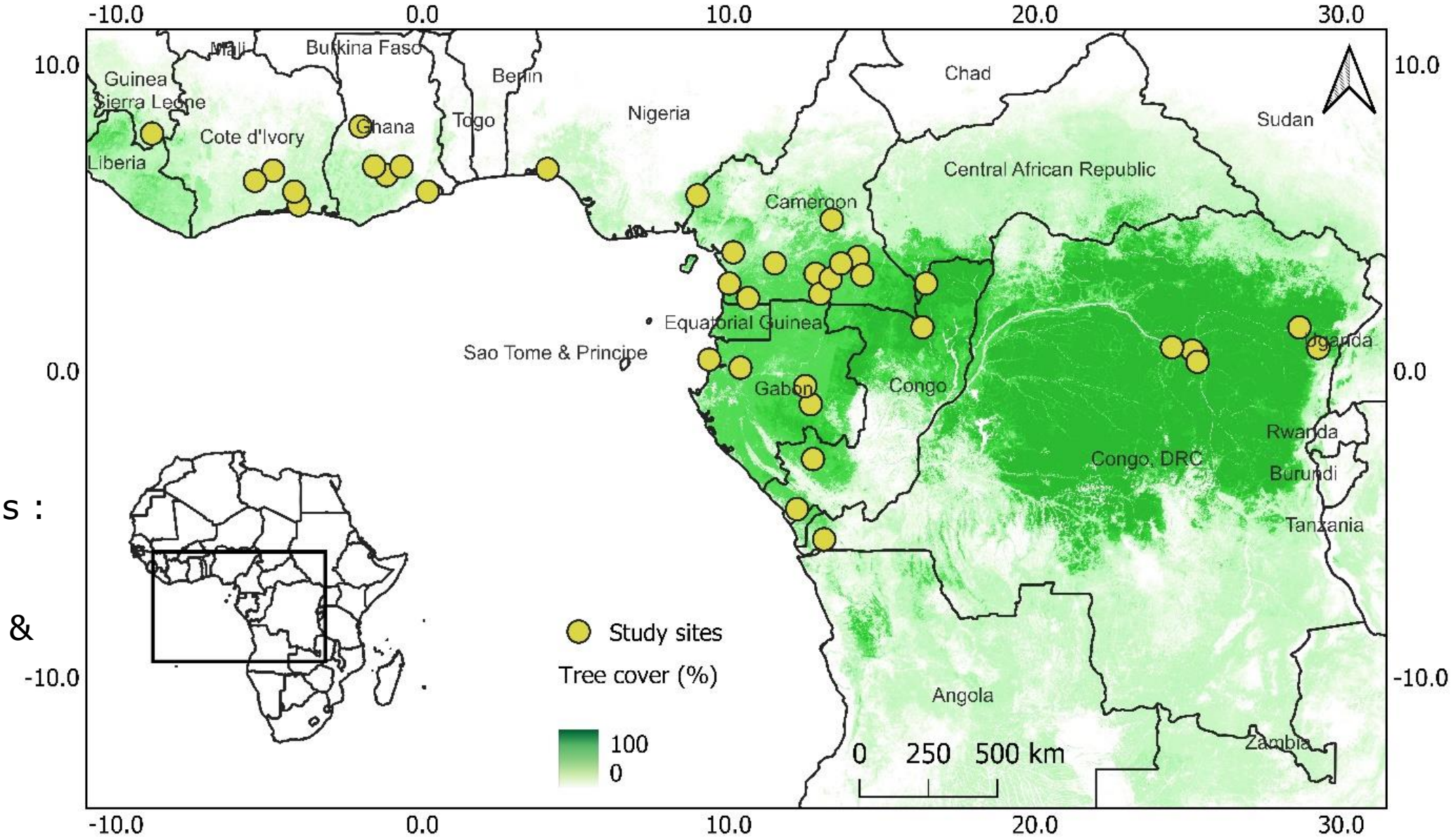
✓ 45 Studies

- 38 sites
- 89 tree species
- 687 observations :

  P = 269;

  NPLD = 338 &

  SB = 80



Methods

Review

LMM

$$\Delta D_{ijkmp} = a + b_1 M_j + b_2\, G_k + b_3\, D_m + b_4\, W + b_5\, M_j * G_k + \alpha_i + \beta_p + \varepsilon_{ijkmp}$$

Survival, **height** and **diameter growth** **?**

Fixed effect: Age

- Planting methods (M_j)
- Guild (G_k)
- Forest type (F_l)
- Dispersal mode (D_m)
- Wood Density (W)
- Leaf phenology (L_n)

Random effect: Site (β_p) & Species (α_i)

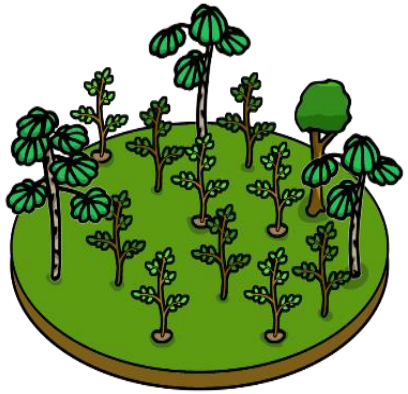
Understorey

Line planting

Gap

Degraded area

Regrowth



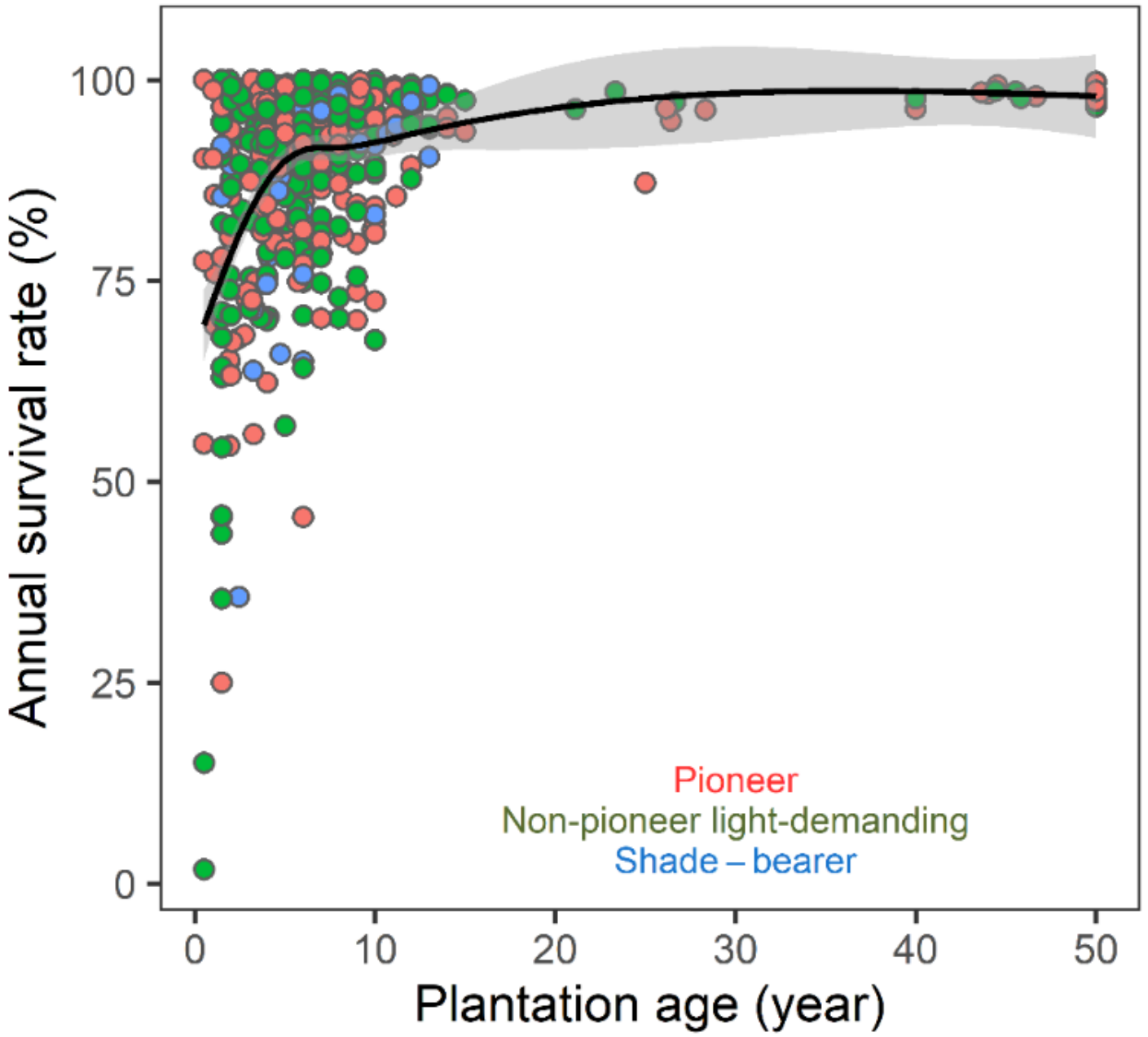
Clear-cutting

Results

Planting tree Survival

- Tree mortality was highest in the first seven years and became negligible after that.

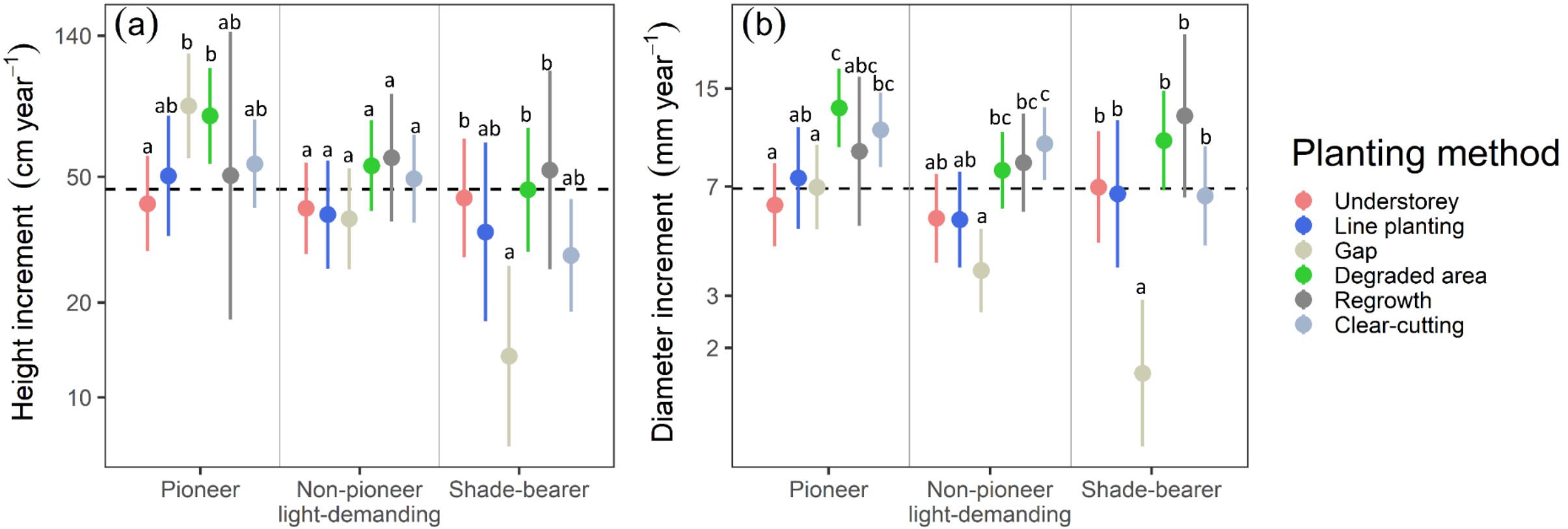
- We were not able to identify any other factors influencing survival based on the data analysed.



Results

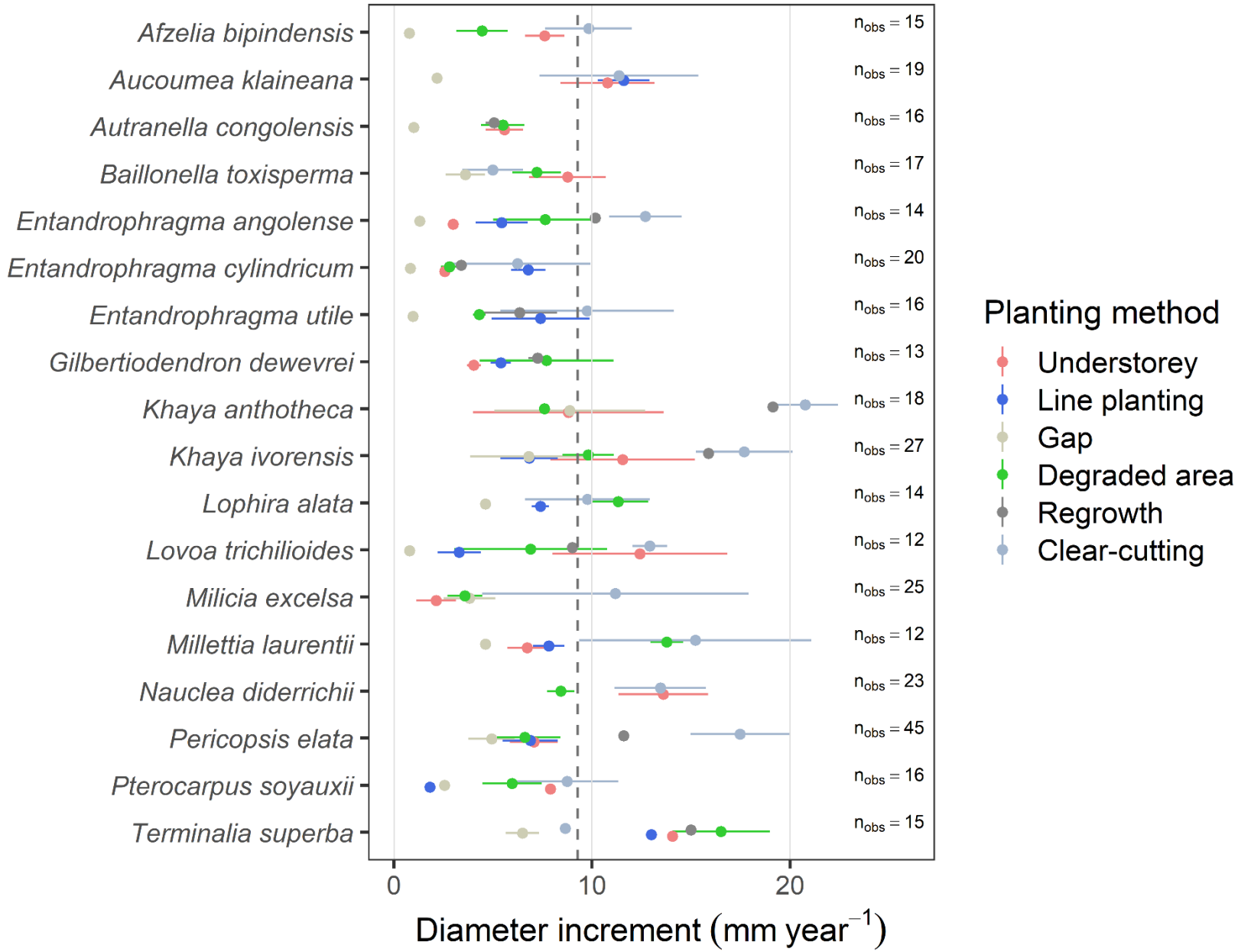
Height and diameter growth

- Degraded areas, regrowth and clear-cut showed higher growth for P, NPLD and SB
- The gap showed poor results, except for heigh growth for pioneer trees



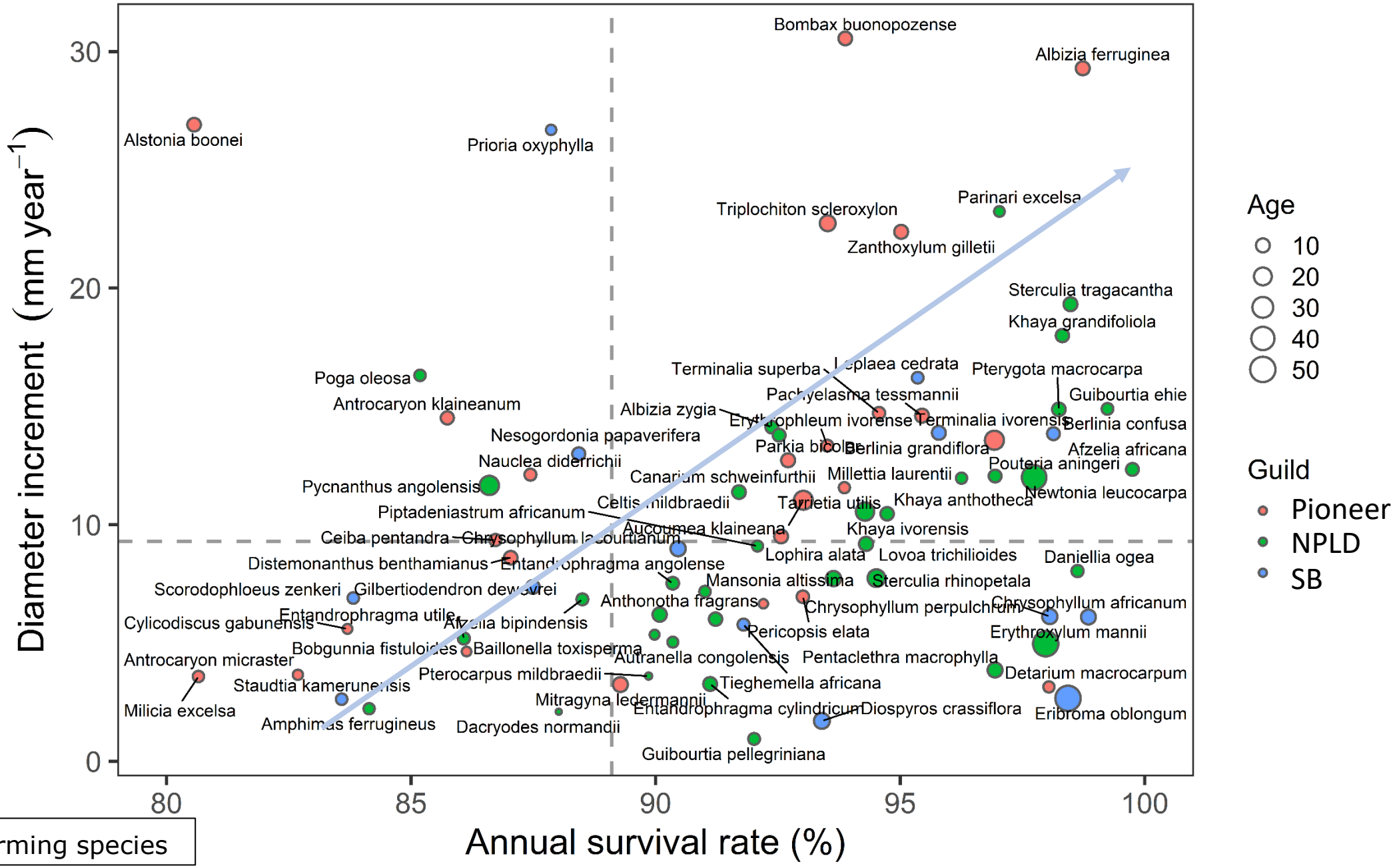
Results

Diameter increments across planting methods



Results

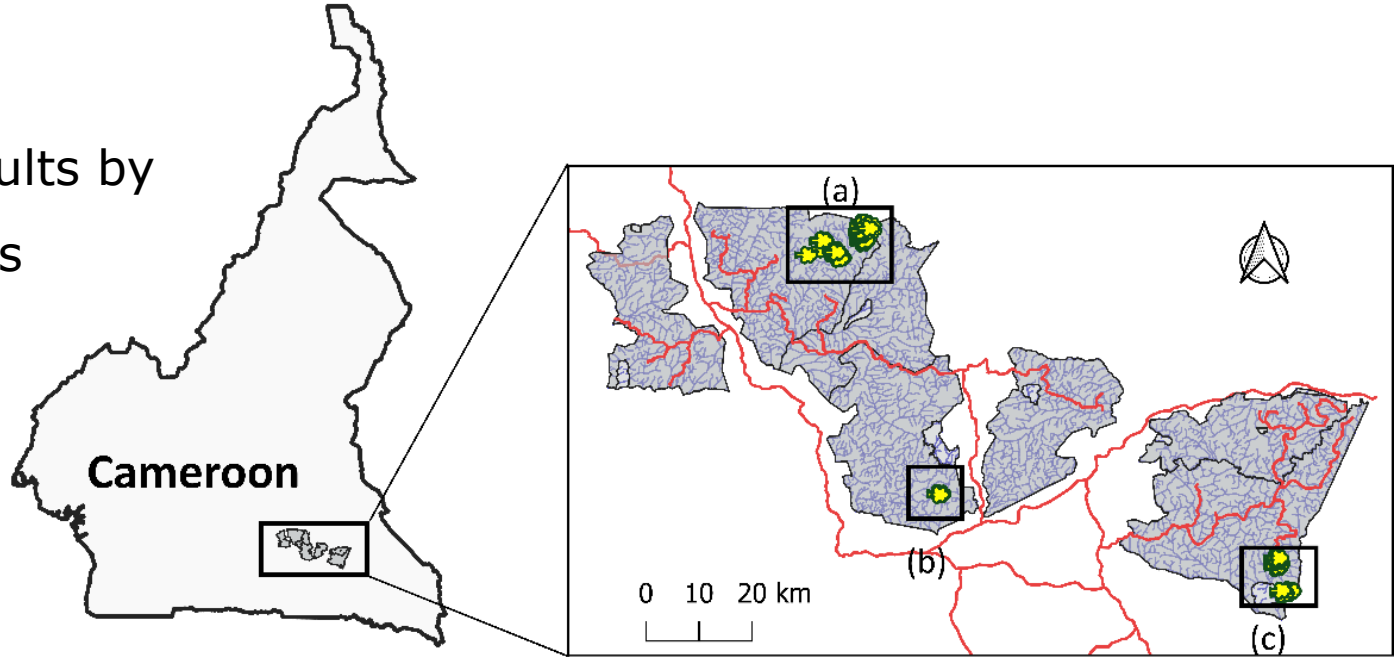
Good performing species



Poor performing species

Research perspectives

Verify the validity of these literature-based results by modelling the survival and growth of 36 species planted in gaps (logging gaps & log yards) and degraded areas of south-east Cameroon.



In the gaps, preliminary results showed that: *Terminalia superba, Baillonella toxisperma* & *Erythrophleum suaveolens* had good performances.


Logging gap


Log yard


Degraded area

Take-home message

- Mortality is the highest during the seven first years
- An appropriate correspondence between species guild and planting method for planting
- To choose the species for planting, prioritize species with high survival rate and large diameter increment

Thank You.

Contact Details

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