

Modelling plantation growth of central African timber species and implications for their sustainable management

Crispin ILUNGA-MULALA MUSHAGALUSA¹, Gauthier LIGOT¹, Achille BIWOLÉ², Jean-Louis DOUCET¹

1. Forest Is Life, TERRA Teaching and Research Centre, Gembloux Agro-Bio Tech, University of Liège, Passage des Déportés 2, 5030 Gembloux, Belgium — 2. Laboratory of Forest Resources and Wood Valorisation, Advanced Teacher's Training College for Technical Education, University of Douala, P.O. Box. 1872, Douala, Cameroon

INTRODUCTION

In Africa, only a few tree species are logged for market reasons. Despite changes in forestry legislation and commitments to more sustainable management, there is a growing scarcity of some timber species. The regeneration of harvested species should be promoted by developing plantation programmes (Doucet et al. 2016). The aim of this study is to identify the species best suited to the logging gaps and define silvicultural itineraries.



Figure 1. Enriched environments in the study areas. Above: 1-year-old gap and log yards. Below: a 1-year-old plantation in a degraded area and *Pericopsis elata* seedlings in a nursery

MATERIAL AND METHODS

The study area is in the forest management units granted to Pallisco company (East Cameroon). For several years, that company has been planting timber species in gaps, log yards and degraded areas. Tree survival, height and diameter were measured in 177 logging gaps ($\pm 250 \text{ m}^2$) enriched with 2300 seedlings for 15 timber species and monitored for up to 19 years. The maintenance effect in the canopy gaps was tested. The key factors of plantation success were evidenced fitting linear mixed models.

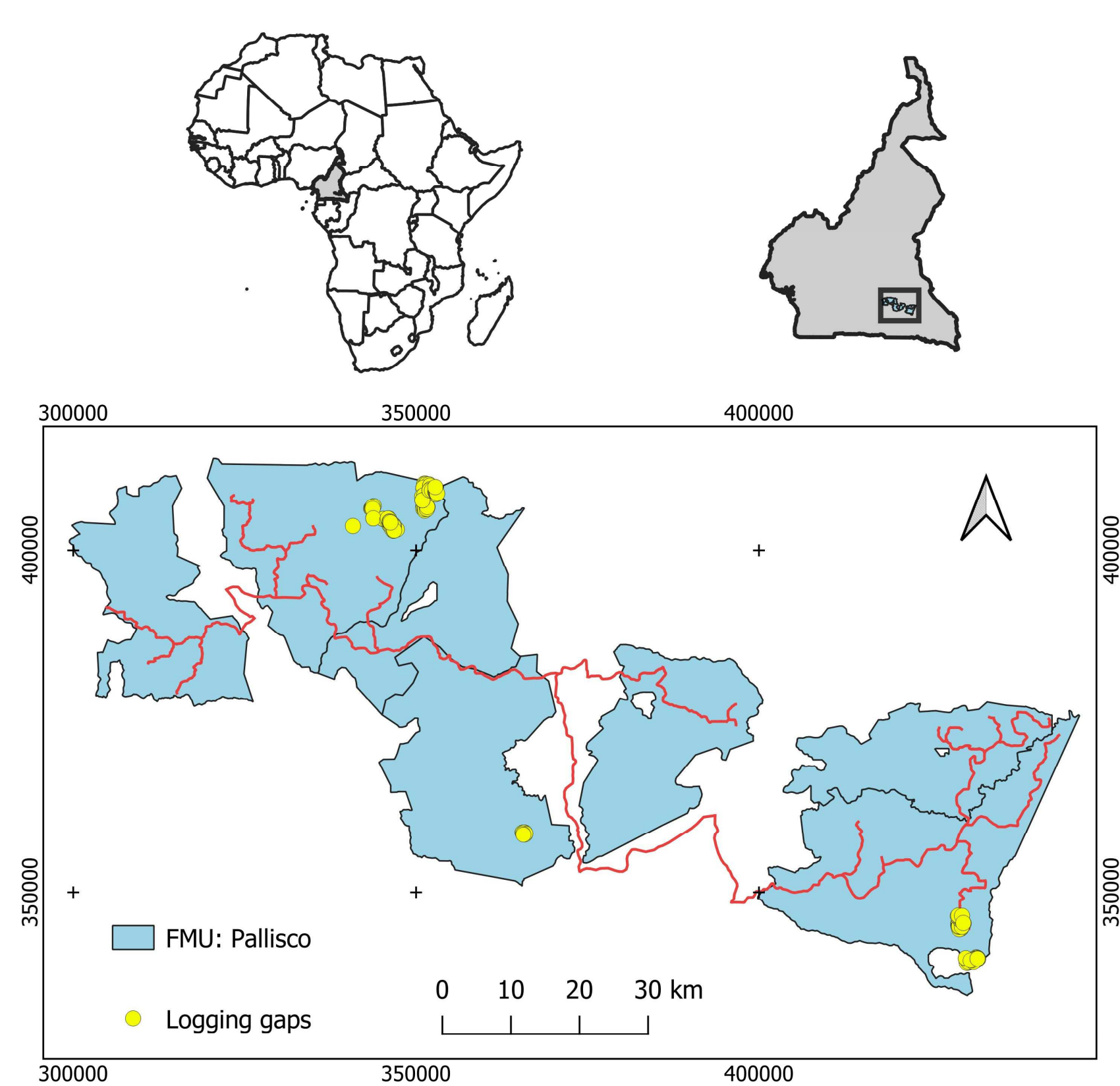


Figure 2. Location of the study area

RESULTS

Survival rates varied across species. *Baillonella toxisperma* (moabi), *Erythrophleum suaveolens* (tali), and *Detarium macrocarpum* (mambodé) had higher survival rates (over 65%). All *Entandrophragma cylindricum* (sapelli) individuals died.

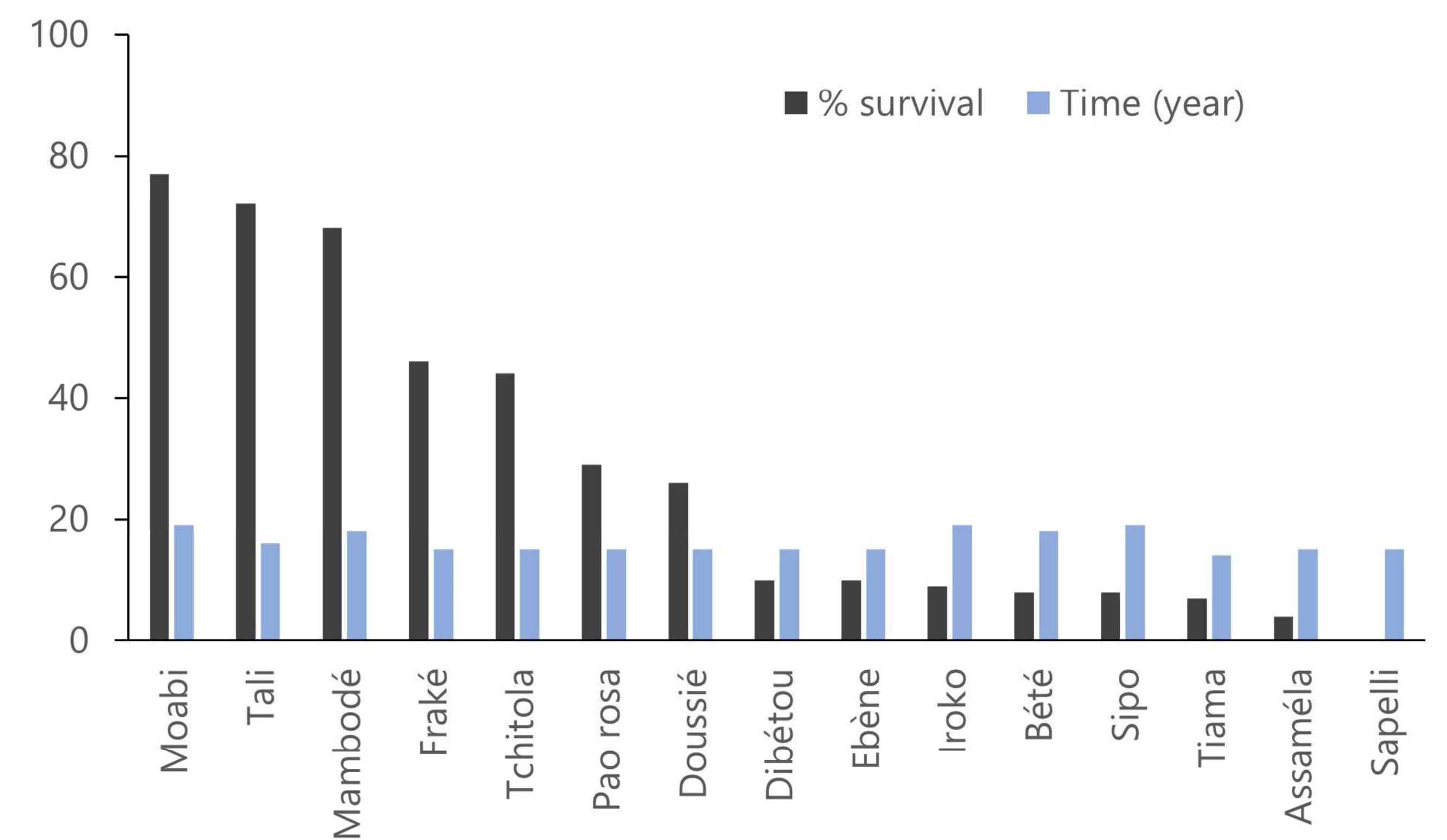


Figure 3. Annual survival rates of 15 timber species in the enriched logging gaps

Diameter increments varied significantly across species ($F = 65.8$; $p < 0.001$). *Terminalia superba* (fraké) had the highest diameter increment ($13.2 \pm 7.2 \text{ mm year}^{-1}$). Species showed differences in diameter increments across maintenance types ($F = 11.4$; $p < 0.001$). *P. elata* showed higher diameter increment when the seedlings were maintained within a 1 m radius.

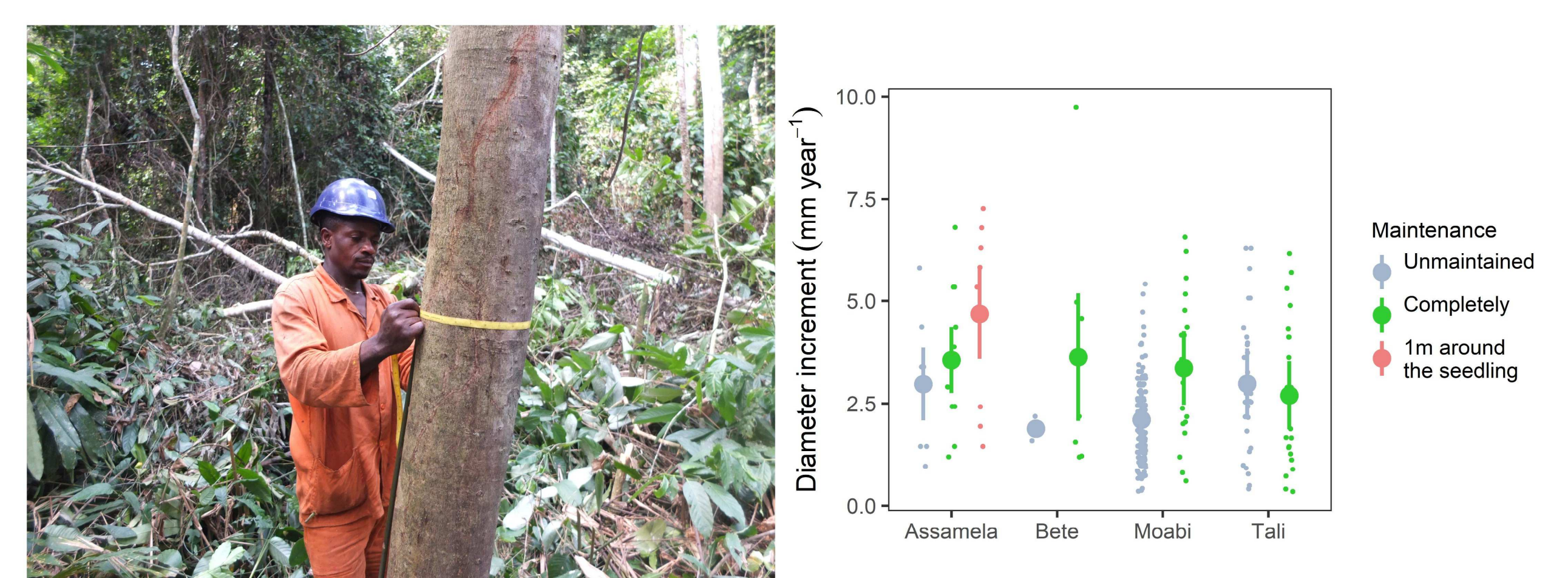
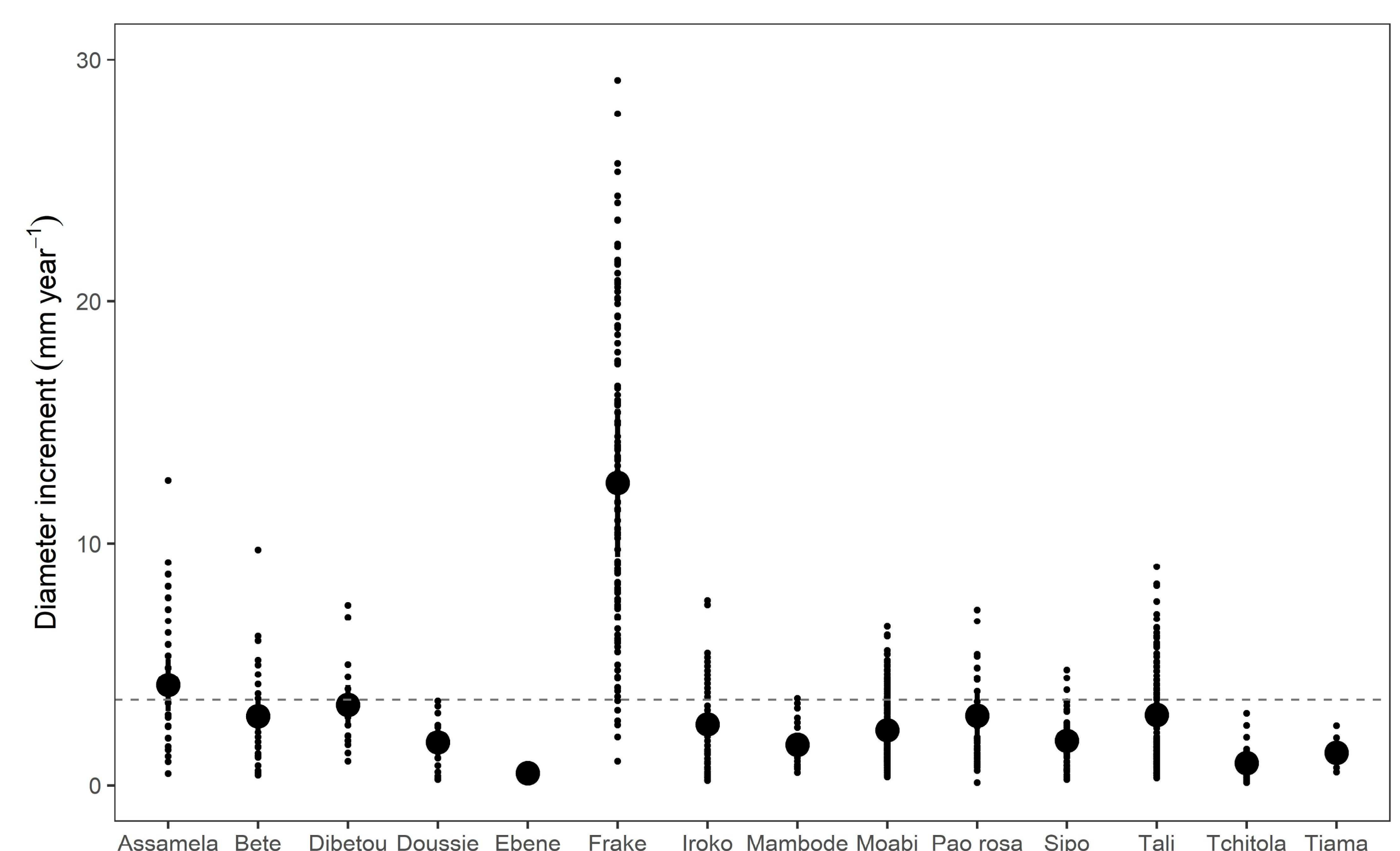


Figure 4. Above: diameter increments of species in logging gaps. The dashed line showed the overall mean. Below: A 15-year-old *Terminalia superba* tree in the gap and the effect of maintenance on the growth

CONCLUSION

Results of this study, based on a long monitoring period of timber species, show the importance of species selection and maintenance in the enrichment of logging gaps. *T. superba*, *B. toxisperma*, *E. suaveolens* and *D. macrocarpum* are better suited to the gap enrichment. Further work in log yards and degraded areas will enable us to recommend the best silvicultural itineraries.

REFERENCES

Doucet J, Dainou K, Ligot G, et al (2016) Enrichment of Central African logged forests with high-value tree species : testing a new approach to regenerating degraded forests. Int J Biodivers Sci Ecosyst Serv Manag 3732:1–13.

