

Wood Specific Gravity and Wood Color Variation from Branches, Trunks and Roots of Native Tree Species from the Tropical Rainforest of Madagascar



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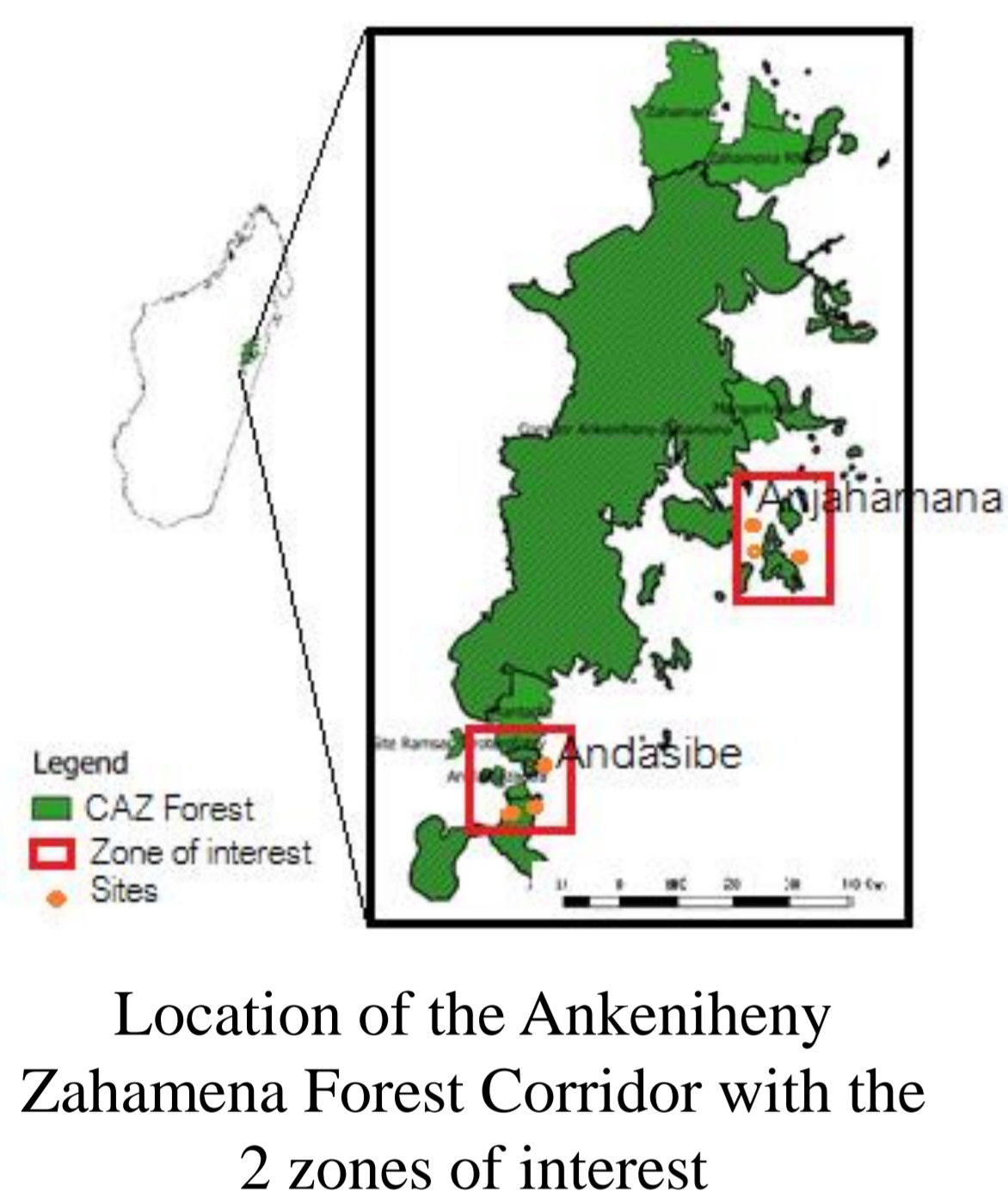
INTRODUCTION

Literature about variation in the wood properties of Malagasy tree species are scarce. Studies investigating the wood properties variation in the tropical forests trees have been often restricted to the main stems and branches (Sarmiento et al., 2011). However, wood specific gravity (WSG) is a variable functional trait involved in all tissues of wood along the root-to-shoot flow path. Thus this is the first study assessing this variation on species from Madagascar. WSG is also correlated with wood color and this latter is mostly determined by the extractives (Moya et al., 2012).

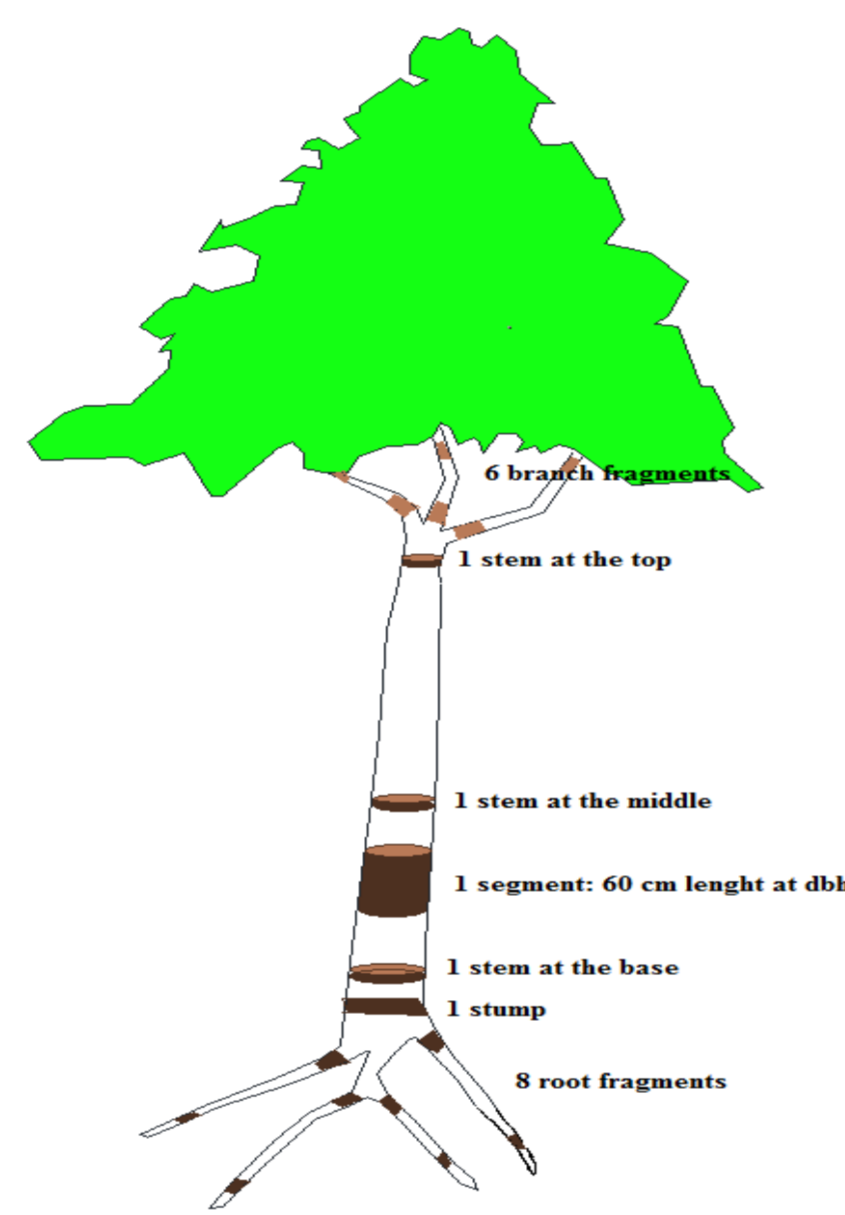
Aims of this research: 1) to analyze the longitudinal variation of WSG and wood color of branches, trunk and roots; 2) to determine the relationship between these traits and the extractive contents.

METHODS

Study sites



Wood sampling

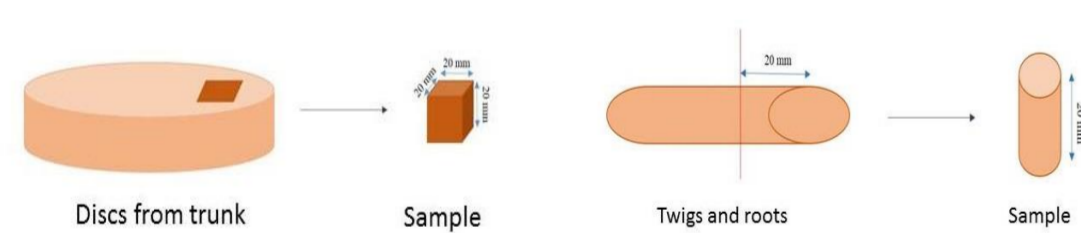


Species

10 species belonging to 4 genera: *Cryptocarya*, *Symphonia*, *Syzygium*, *Uapaca*

Organ	Number of samples
Branch	187
Stem	150
Root	236

Wood processing



Labwork

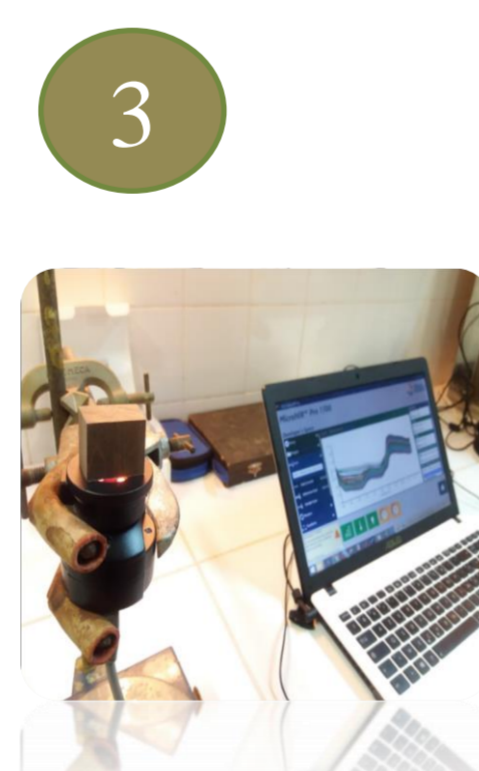
1 WSG measurement: dry mass per fresh volume



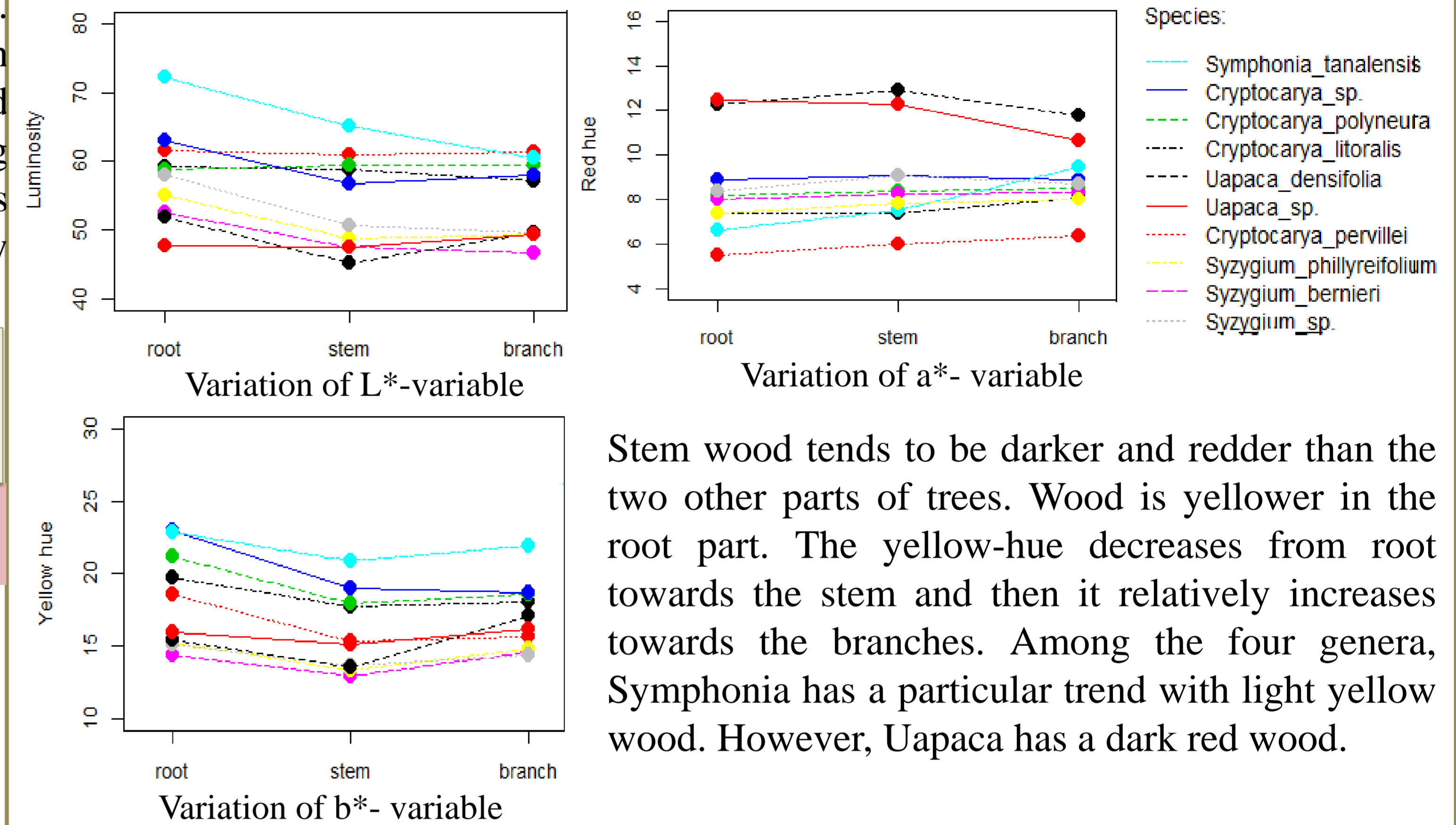
2 Wood color measurement: using CIELab color system with a portable spectrophotometer CM-2500d



3 Wood chemical prediction: Use of calibrated near infrared (NIR) spectroscopy: a VIAVI MicroNIR portable spectrometer for predicting extractive contents

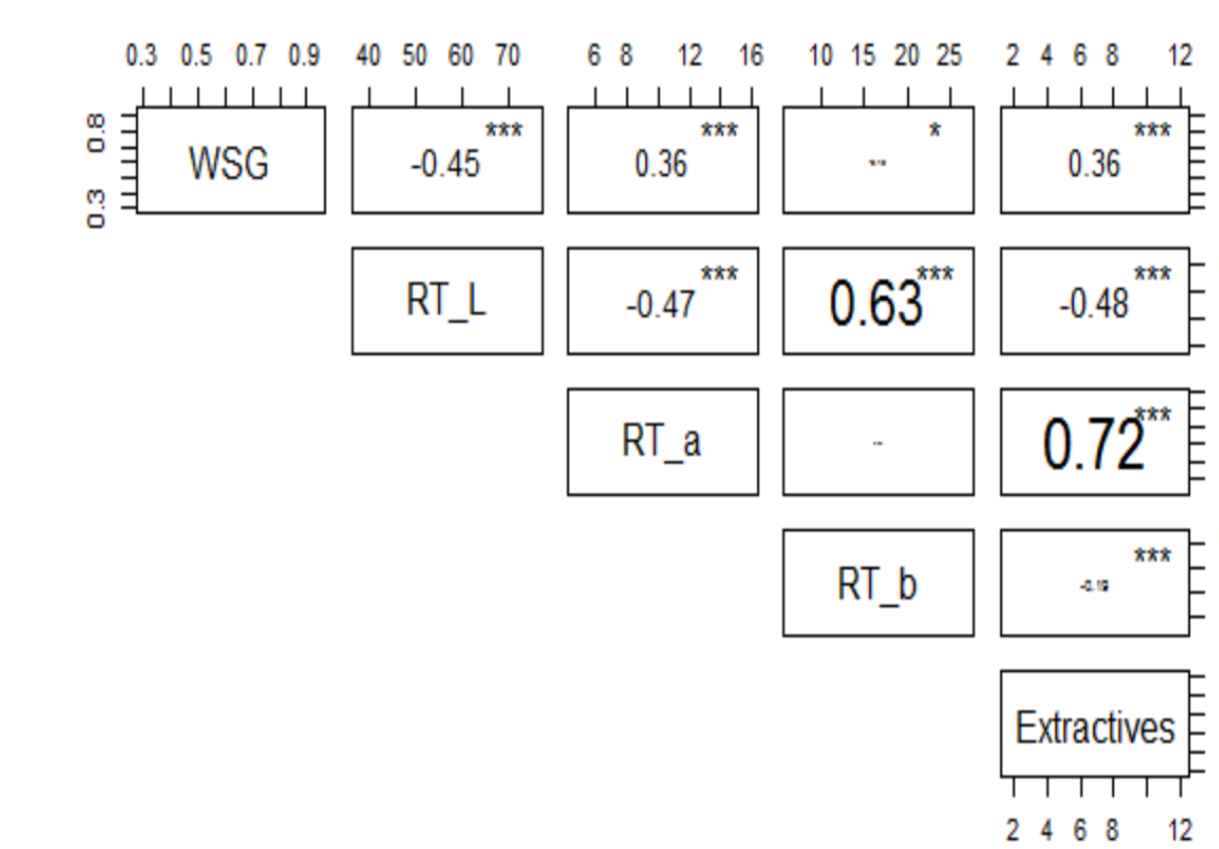


Variability of wood color variables (L*, a*, b*) among and within species from roots to branches



Stem wood tends to be darker and redder than the two other parts of trees. Wood is yellower in the root part. The yellow-hue decreases from root towards the stem and then it relatively increases towards the branches. Among the four genera, *Symphonia* has a particular trend with light yellow wood. However, *Uapaca* has a dark red wood.

Correlations between WSG, wood color variables and extractives content



WSG is correlated negatively with the lightness, positively with the red-hue and the extractive contents. Correlations were negative between lightness and the red hues, positive between lightness and the yellow hue. Species with high extractive contents tend to have redder and darker wood (positive and significant correlation between extractives and a*, negative and significant correlation between extractives and L*).

DISCUSSION

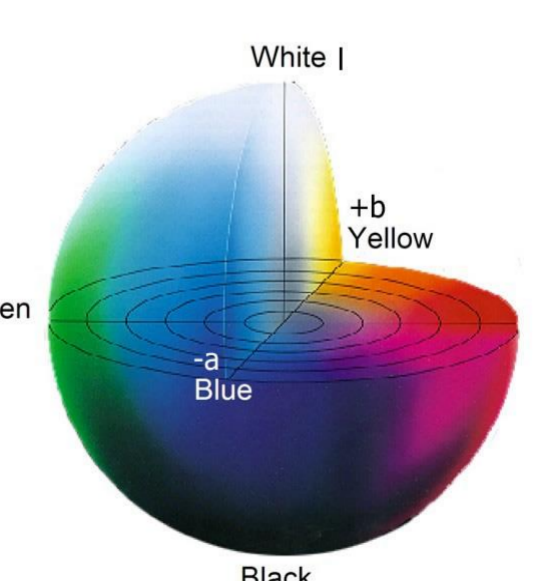
The root WSG is **significantly less dense** than the stem and branch WSG. The knowledge of root WSG may be important for the accurate estimation of the belowground total biomass. Nonetheless, investigating the relationships between the WSG of these parts of trees is crucial because of the impact of excavating root system within a forest.



The results of this study on the correlation between WSG and color variables **agree with the general relationships observed in tropical hardwoods**, i.e., that species with lower wood densities tend to have lighter and yellower colored wood, and those with higher density tend to have darker and redder colored wood (Nishino et al. 1998).

REFERENCES

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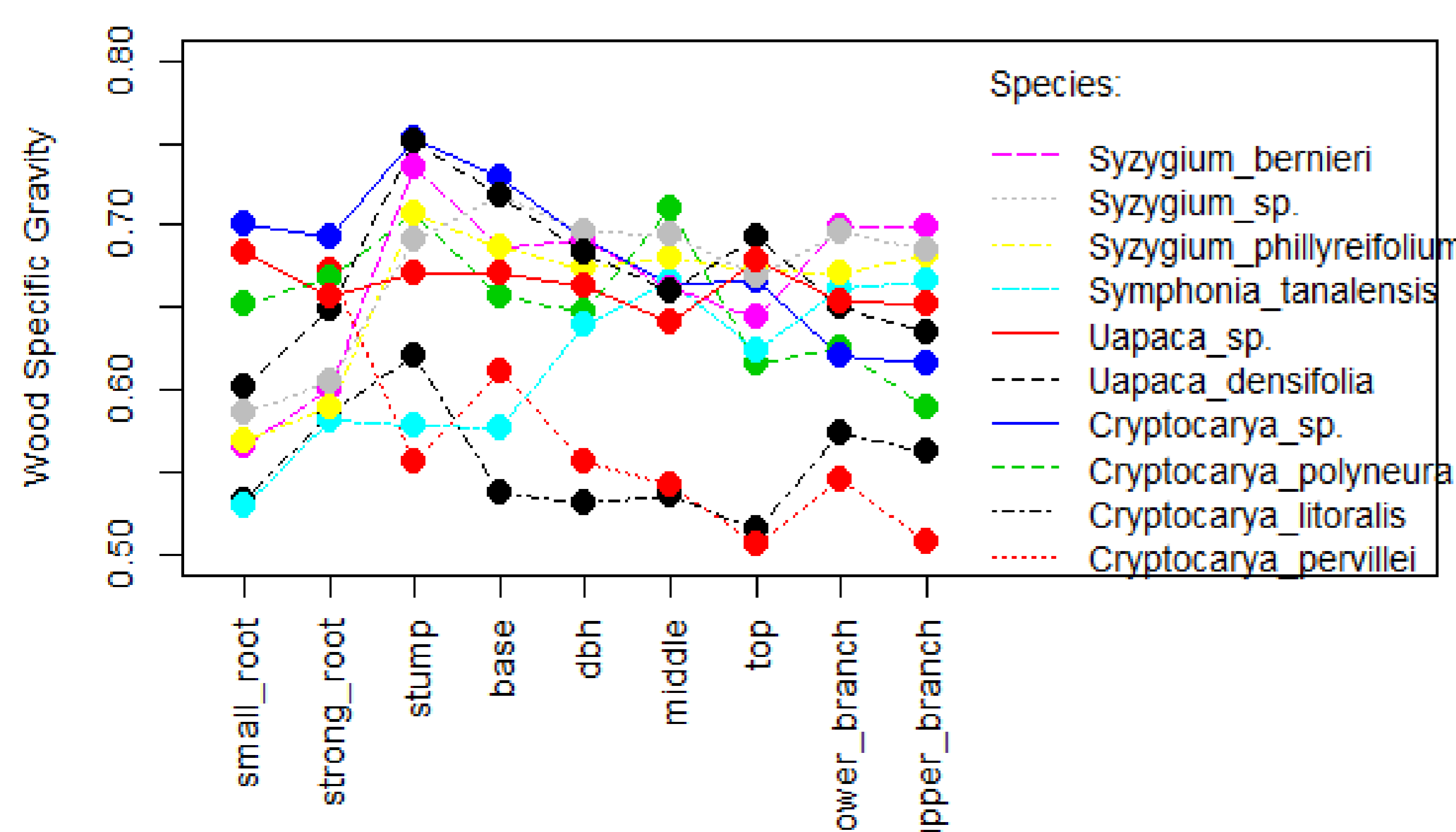


ACKNOWLEDGMENTS



RESULTS

Variability of WSG among and within species from roots to branches



All the species showed increasing pattern of WSG from the small roots to the stump where the higher value is observed. Then most of the species exhibited a decreasing trend of WSG value along the stem excepted for *Symphonia tanalensis*.