Is colour an indicator for phenolic content in *Tectona grandis* from plantation of Côte d'Ivoire?

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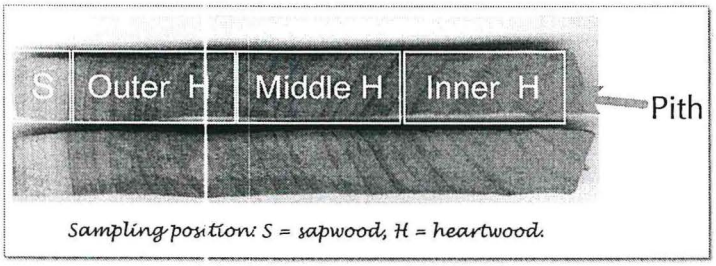
TEAK is one of the most valuable timber widely used in the world. It is prized for its colour, aesthetic and natural durability. A variability has been observed in wood properties with consequences for forest managers and end-users. Determining some attributes for earlier characterization of wood quality may be useful. Wood colour is an important criterion of wood quality and depends on the chemical components of wood (HON and MINEMURA, 2001). We assessed the use of colorimetry to determine the content of phenolics in the wood.

Material and Method

9 trees of teak were collected in Agboville (Séguié). Samples were taken from sapwood (S), outer heartwood (OH), middle heartwood (MH) and inner heartwood (IH).

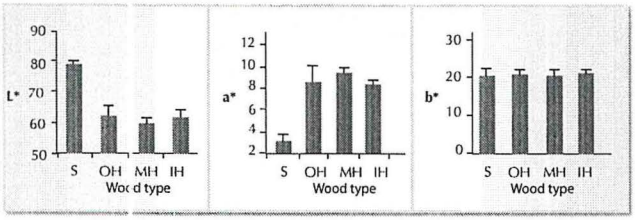
Colorimetric values of the CIELAB system: lightness (L*), redness (a*) and yellowness (b*) were measured with a spectrocolorimeter Datacolor 200.

Phenolics were analyzed with a HPLC system coupling to a DAD detector.

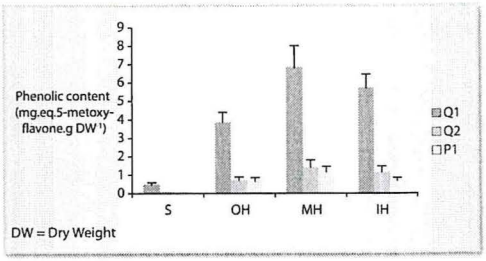


Sampling position: S = sapwood, H = heartwood.

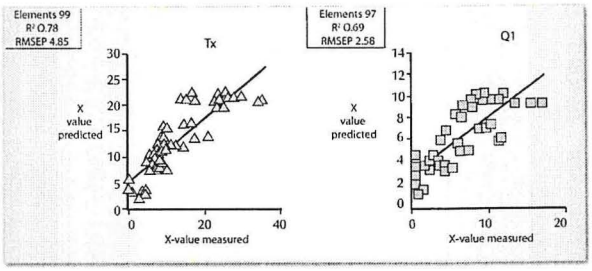
Results and Discussion



Teak sapwood is lighter, less red than heartwood. The heartwood is redder with distance from pith. Teak wood is evently yellow through the stem. Heartwood of Ivorian teak is red as teak from Togo but redder than teak from India (KOKUSTE *ET AL.*, 2006; THULASIDAS *ET AL.*, 2006).



Three major compounds were characterized as tectoquinone (Q1), 2-hydroxymethylanthraquinone (Q2) and an unidentified compound named P1. Q1 was present in sapwood and accumulated in heartwood. Q2 and P1 appeared and accumulated only in heartwood. Phenolics increased from the outer to the middle heartwood and decreased in the inner heartwood. The change in colour of wood was conspicuous with the darkening and the reddening of wood.



The relationships between Tx and Q1 contents and colour coordinates follow the equations:

$$Tx = 101.1 - 1.2L^* - 1.18a^* - 0.2b^*;\ R^2 = 0.78;\ P < 0.0001$$
$$Q1 = 56.3 - 0.68L^* - 1.07a^*;\ R^2 = 0.69;\ P < 0.0001$$

PLS regression shows high correlations between colour coordinates and contents of total soluble phenolics (TX) and Q1: it suggests that more phenolics accumulated in teak wood, darker the wood is.

Conclusion

Accumulation of phenolics were found to coincide with the change in colour of wood. Therefore, colour measurement could be used as a tool for determining phenolics content of wood. Total soluble phenolics were predicted using L*, a * and b* (78% of total variation). More investigations are required for optimal calibration using a large scale of samples to perform the prediction.

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