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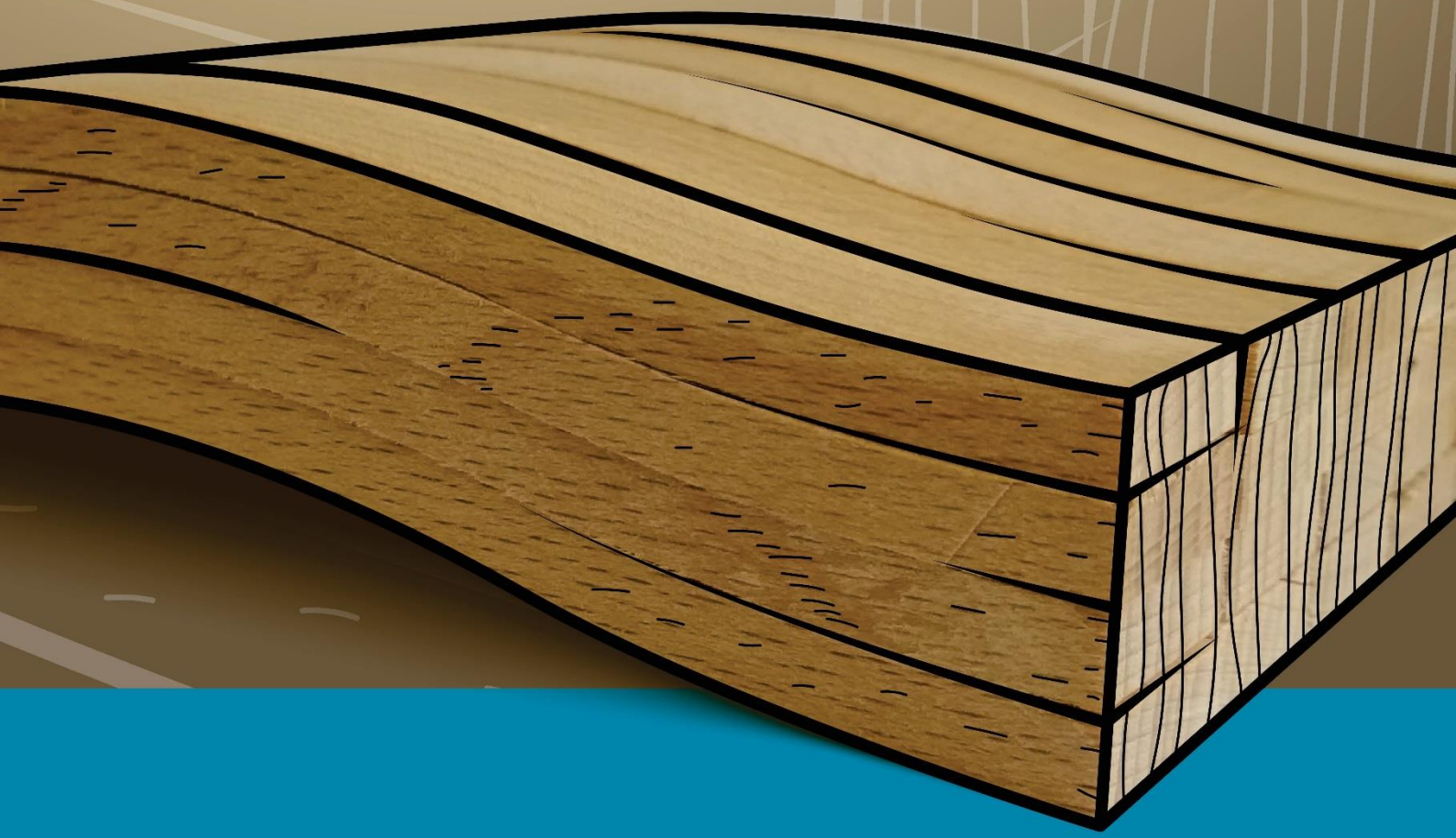

WOOD KPLUS

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10TH HARDWOOD CONFERENCE PROCEEDINGS

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Extractives content of wood Sclerocarya birrea and Anogeissus leiocarpus trees

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ABSTRACT

The aim of this research was to study the amount of extractives content (%) of two hardwood species, namely, *Sclerocarya birrea and Anogeissus leiocarpus*, growing in Lagawa Natural Forest Reserve in Western Kordofan State, Sudan. Extraction of wood extractives were determined according to TAPPI T204 and TAPPI T207 standard. Cold water, hot water and one percentage NaOH solutions were used for extraction wood. The mean values of extractives content (%) of wood *S. birrea* and *A. leiocarpus* were 13.85% and 17.38%, respectively. The analysis result of comparison t-test shows significant difference between mean extractives content for wood *S. birrea and A. leiocarpus*.

INTRODUCTION

Basically, wood is cellular in structure with cell wall composed of polysaccharides (cellulose and hemicellulose) and lignin. Beside the main constituents, some chemicals known as extractives (Koch 1985). Extractives are found on cell lumens and inside cell walls (Panshin and de Zeeuw 1980). It can be present in small or large amounts (from 3 to 30 percent), depending on the species (Conners 2015).
(Sjostrom 1981) stated that extractives can be divided into three major classes, namely, aliphatic compounds (fatty acids, fatty alcohols, waxes and fats, gums, glycosides), terpenes and terpenoids (pinene, cadinene, abietic acid), and phenolic structures for instance phenolic acids, tannins, flavonoids, lignans, and stilbenes. The main function of extractives are food services, protection, and plant hormones. Extractives content could be removed from a piece of wood using benzene-alcohol, acetone, organic and inorganic solvents (Dinwoodie 1980).
Extractives content significant vary among species, within tree height from bottom to top and between heartwood and sapwood (Yang and Jaakkola 2011, Sjostrom 1981). As well, tree age, growth conditions and sits play important role for extractives variation (Nisula 2018). The extractives content varies due to many factors such as extraction process solvent type, wood origin and type of chemical compounds present in the wood (Sabik et al. 2016, Passialis et al. 2008). As known depending on polarity, each solvent isolated different chemical component. Consequently, (Chow et al. 1996) recommend using multiple method to assess extractives content.
Extractives are very important in the utilization of hardwood and softwood because of their contribution to wood properties (Boasiako and Pitman 2009). It protects wood from decay, add color and odor to wood, accent grain pattern, and enhance strength properties (Panshin and de Zeeuw 1980). Likewise, it effects on equilibrium moisture content (Zeinab et al. 2017), and bonding wood (Roffael 2016).
Sclerocarya birrea is a savanna tree up to 12 m high. Bark is grey fissured, flaking in small or large scales; slash orange pink with green edges; branchlets stout, scarred (Sahni 1968). The description, distribution, and uses of *Anogeissus leiocarpus* mentioned by (Arbab 2014, Sacande and Sanogo 2007).
The objective of this research was to look at amount of extractive's content (%) of two hardwood species *S. birrea* and *A. leiocarpus* growth in Sudan.

MATERIALS AND METHODS

The wood sample comes from three trees for each species of *S. birrea* and *A. leiocarpus* growing in Lagawa Natural Forest Reserve in Western Kordofan State, Sudan. The trees were straight, and free from natural defects. The trees were felled with a chainsaw and three 50-cm long sample logs were removed from each tree bole. Samples (n=27) were selected from each species, then ground to sawdust. The extraction method was carried out according to TAPPI T204 and TAPPI T207 standard. Tow grams of each sample of the raw material were extracted using cold water, hot water, and one percent sodium hydroxide. Then samples of raw material were dried in oven dry and weight on a sensitive balance. Extractives percent (Ex. Con) calculated using E.q.1:

$$\text{Ex. Con\%} = 100*(\text{W1-W2})/\text{W1}\text{Eq. 1}$$

$$\text{Ex. Con \%} = 100 * (\text{W1} - \text{W2})/\text{W1} \qquad \text{Eq. 1}$$

Where:
W1= weight of specimen before extraction
W2= weight of dried specimen after extraction.
Statistical analysis was conducted using R program (version 4.1.2, 2021). Two Sample t-test conducted to determine significant difference between mean extractives content of *S. birrea* and *A. leiocarpus*.

RESULTS AND DISCUSSION

The mean values of extractives content (based on oven-dry weight) of wood *S. birrea* and *A. leiocarpus* trees given in table 1. The values for *A. leiocarpus* were higher than that value (11.03 %) reported by (Zeinab et al. 2017). *S. birrea* and *A. leiocarpus* have Lower extractives content compared to *Acacia nilotica, Acacia millefera, Calotropis procera and Prosopis chilensis* (Mohammed 1999).
There was a significant difference (P< 0.001) between mean extractives content of wood *S. birrea and A. leiocarpus*.

Table 1: Wood extractive content (%) of S. birrea and A. leiocarpus.

Species	**Min**	**Mean**	**Max**	**Std dev**	**CV%**
S. birrea	11.66	13.85	16.15	1.59	11.47
A. leiocarpus	13.70	17.38	19.31	2.01	11.57

Min= Minimum; Max= Maximum; Std dev= standard deviation; CV= Confection of variation in percentage.

CONCLUSION

The mean values of extractives content for two hardwood species studied (*S. birrea and A. leiocarpus*) were 13.85 and 17.38 %, respectively.
There was a significant difference in extractives content between wood of *S. birrea and A. leiocarpus*

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TAPPI T-204 Solvent extraction of wood and pulp.

TAPPI T-207 Water solubility of wood and pulp.

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