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EFFECT OF SEASONING MEDIA ON WOOD SEASONING

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Abstract
The effect of two natural seasoning media on wood seasoning was examined. Two wood samples of *Tetrapleura tetrapetra* and *Diospyrus eberium* were collected from the sawmill for evaluation. Wood samples were collected from green woods of very high moisture content and the wood samples for each media were tested under the same environmental conditions (free flow of air, well-drained soil and well-cleared vegetation) in other to compare the rate of drying for the media. The data obtained was first transformed using logit transformation, the transformed data was then analyzed using a T-test to test for the difference between the moisture lost in the two media and the two different species. The results of the experiment indicated a high moisture content of 54.99% and 57.15% were recorded for the two media (open media and closed media) respectively, the result also shows that Ebony has a lower moisture content of 43.59%, compared with *T. tetrapetra* that has a moisture content of 68.55%. It could be concluded that the difference in the drying media does not significantly influence the drying rate of the wood.

Keywords: *Diospyrus eberium*, drying media, drying rate, moisture content, *Tetrapleura tetrapetra*

INTRODUCTION

Wood is a naturally versatile and variable material and there is an urgent need to recognize the virtues and develop means of protecting and rationalizing the use of such a valuable resource. Mitchell (2017) stated that when used for construction, furniture, millwork and other similar uses, wood will perform better if it is dried before use to the equilibrium moisture content. As the wood comes from the tree, it contains an appreciable amount of water frequently as much as 100 – 200 per cent in terms of its oven-dry weight. Wood begins to lose moisture as soon as it is exposed to atmospheric conditions. As the wood dries below the fibre saturation point it shrinks. The shrinkage is not equal in all directions. This inequality in shrinkage in three directions at right angle to one another sets up strains which are unavoidable and may cause fracture in the wood tissues (Gao et al., 2022). For many end uses, wood must be formally dried under controlled measures to perform satisfactorily. If formal drying is not carried out before the final product is made, under-controlled drying will occur in service, often with disastrous results. Wood is dried in a variety of shapes and sizes. The appropriate drying technique depends on size and species. Because there are thousands of tree species or generic groups in the world with some commercial

Proper wood drying is, therefore, an essential process in nearly all wood utilization practices. This means that timber must be dried to the proper moisture content for end–use requirements. Its potential commercial uses are generally affected by the nature and magnitude of the defects that occur during drying. Therefore, timber markets are demanding greater emphasis on improved quality of timber drying and in-

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service moisture contents. Wood drying, however, is the most energy-intensive of all wood manufacturing processes. Water is removed from wood by supplying a large amount of thermal energy (Minea, 2012).

The different drying methods from one another by the source and method of supplying this energy. Air (or natural) drying is simple and not costly, but it takes a long time and dries timber to the equilibrium moisture content only. Kiln drying, on the other hand, is faster and dries wood to any moisture content desired but is very expensive to install and operate and requires skilled operators. Solar drying is expected to be in the middle and have most of the advantages of the two traditional methods mentioned above. So, energy applications began to look more attractive in the past decades (Simo-Tagne Bennamoun, 2018).

Because of the great value of wood, there is an urgent need to recognize these virtues and develop means of protecting and rationalizing the use of this valuable resource. Proper wood drying is therefore an essential process to nearly all wood utilization practices. The different drying methods differ from one another by the source and the methods of supplying the required thermal energy. This research is therefore aimed to compare the rate of drying of wood in the two media due to the difference in the climatic conditions of each medium.

Materials and Method

Study area

The study was carried out in Owo Local Government Area, Ondo State, Nigeria. Wood samples were collected from a sawmill along Amuye Secondary School, Owo, near the Aisewen River. All the wood species in the sawmill were indigenous, e.g. Ebony (*Diospyros eberum*), Uya (*Tetrapleura tetrapetra*), Omo (*Cordia millenii*) etc.

The experiment was carried out at the Department of Forestry and Wood Technology, Rufus Giwa Polytechnic, Owo. The experimental site allows for the free flow of air to increase the drying rate of the wood samples. The soil of the area was well drained and the vegetation well cleared.

Materials

Materials for this study were freshly converted wood samples of *T. tetrapetra and D. eberium*, Wood stacking shed, black polythene sheet, weighing balance, Vernier caliper and measuring tape.

Methodology

Preparation of timber samples

The logs of (*Diospyros eberum*) and Uya (*Tetrapleura tetrapetra*) for this project were collected from a sawmill along Amuye Secondary School, near Aisewen River, Owo. Ten sample sizes of 25 mm × 75 mm × 450 mm were taken from the two species respectively to be used for close-media drying and open-media drying. Another 10 sample sizes of 20 mm × 20 mm × 60 mm were also collected from the two species respectively for oven drying to be able to determine the actual moisture content of the two tree species on this note, the study was divided into two phases: Fieldwork and Laboratory work.

Field Work

The field assessment was carried out in closed-air medium and open-air medium. Each medium was loaded with 10 Samples of 25 mm×75 mm×450 mm of uya and ebony wood respectively.

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Laboratory Work

Determination of initial moisture content

The initial moisture content of the sample sizes of 20 mm × 20 mm × 60 mm was determined by taking the green weight of the samples before loading into the oven and drying for 24 hrs at 103±2^{0}C until the weight was constant after which the oven-dry weight was taken. The initial moisture content of the wood was determined using:

$$\% \text{ M.C} = \left(\frac{w1-w2}{w2}\right)100 \ldots 1$$ (Fu et al, 2022)

Where:

MC = Moisture content

W_1 = Initial weight (green weight)

W_2 = Final weight (oven-dried weight)

Determination of drying rate

The drying rate was determined by taking the green weight of the 45 samples of 25 mm×75 mm×450 mm of uya and ebony before they were loaded into the closed and open air-drying media.

Thereafter, the weight of the samples was taken at intervals (every other day) using a weighing balance until the constant weight was obtained to determine weight loss due to drying in the two media.

The rate of moisture loss was determined using:

$$\% \, moisture \; loss = \left(\frac{\text{Current weight}}{Est.OD \; weight} - 1\right) \times 100$$

…… 2 (Fu et al, 2022)

Data Analysis

Data collected in this study were analyzed to determine the difference in the effect of climatic factors on the wood samples in the two media. The moisture content data was first transformed using logit transformation, the transformed data was analyzed using a T-test to test for significant differences between the moisture lost in the two media and the two different species. Statistical analysis was carried out using Statistical Package for Social Sciences (SPSS) version 21.

Result

Average Drying Rate of Wood in the Two Media

Figure one below shows the average drying rate of wood in the two media. The table shows that open media has the highest drying rate with a moisture content of 54.99% while close media has a lower drying rate with a moisture content of 57.15% (Figure 1).

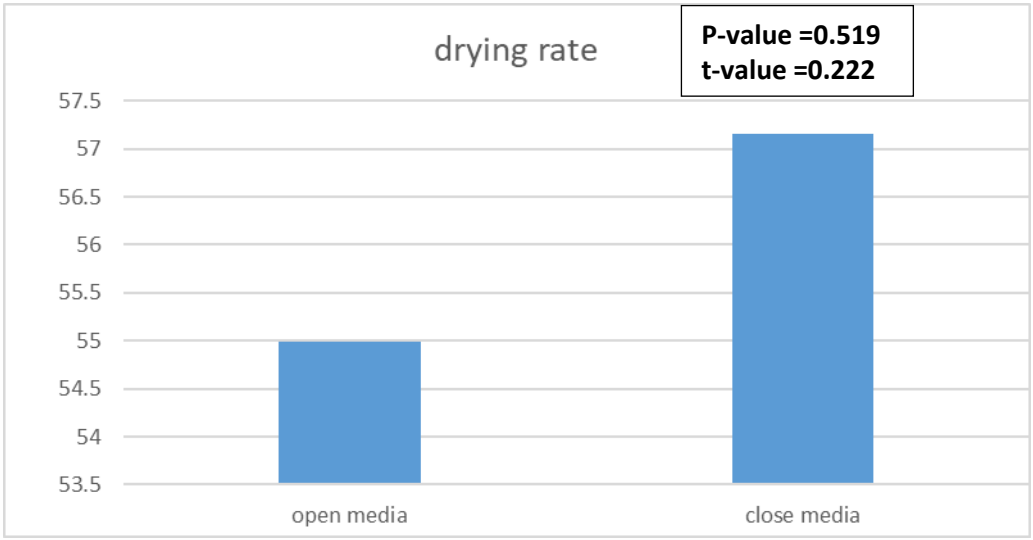

Fig 1: Average Drying Rate of Wood in the Two Media

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The Differences in Drying Rate of the Two Species Used for the Drying Media

Table 2 below shows the difference in the drying rate of the two species used for the drying media. The table shows that Ebony has a higher drying rate of 43.59%, while Uya has a lower drying rate of 68.55% (Figure 2).

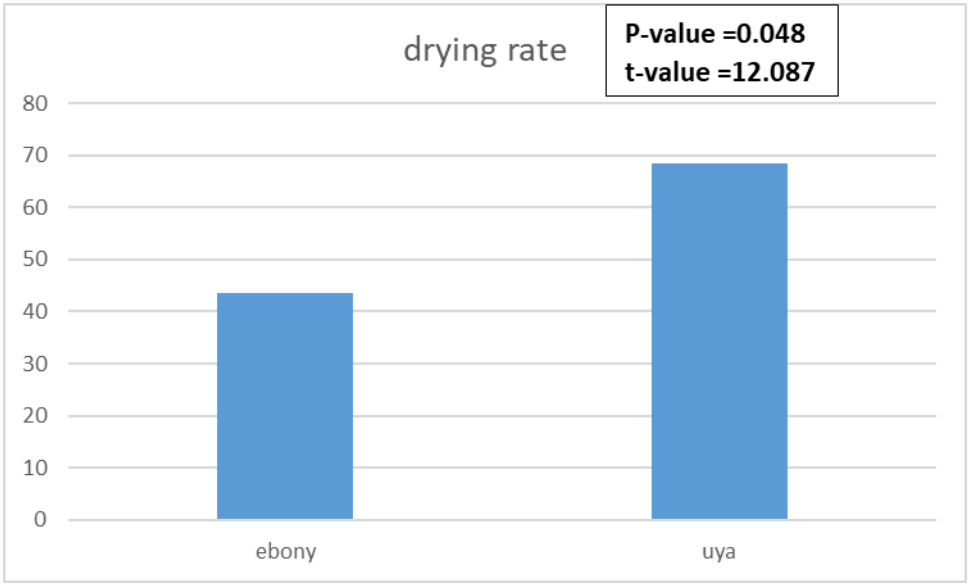

Fig. 2: The Differences in Drying Rate of the Two Species Used for the Drying Media

Discussion

This experiment was carried out to determine the moisture content of wood in two media [open and closed. The difference in the moisture content of the two media is compared due to the difference in the climatic condition of each medium. It was discovered that the open media has a higher drying rate than the closed medium, which may be because of the flow of air along the surface of the wood. This is consistent with the work of Visser et al. (2014), who reported that a decrease in wood moisture content is higher in uncovered (open) small logs than in covered large logs. However, when the result of the drying was subjected to statistical analysis, it was discovered that there was no significant difference between the two media.

When comparing the two different species that were used for the experiment i.e. Ebony (*D. ebenum*) and Uya (*T. tetraplera*). It was discovered that ebony has a higher drying rate than Uya. This could be a result of the lower density of Uya compared to ebony. The statistical analysis shows a significant difference in the drying rate of the two species which confirms that the difference in drying rate could be a result of the difference in the species of wood used (Avramidis et al., 2023).

Conclusion

It could be concluded from the result of the research that the difference in the drying media does not significantly influence the drying rate of the wood tested. However, the difference in the species used to a great extent influences the drying rate of the wood. It is recommended that any of the two drying media could be suitable for drying wood.

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