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The Effect of Ignition Time on Fifty-Two Selected Nigerian Timbers.

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ABSTRACT

Effects of ignition time on fifty two selected Nigerian timbers were analyzed in other to note the time for each wood's combustion. Fifty- two (52) timber samples were collected from fourteen States in Nigeria namely Anambra, Enugu, Ebonyi, Imo, Delta, Edo, Cross River, Akwa Ibom, Abia, Oyo, Lagos, Kano, Sokoto and Rivers State.The timber samples were obtained from the timber sheds at Nnewi, Awka, Enugu, Abakaliki and Benin. The results obtained show that *Combretodendron macrocarpum* (1.67sec.) had the least ignition time while *Dichrostacys cinerea* (28sec.) recorded the highest ignition time. Twenty three timbers ignited easily between 1.67-5.0 seconds, nineteen timbers ignited between 5.33-10 seconds, five timbers ignited between 12-15 seconds and five timbers ignited above 15 seconds. There are some timbers with the same ignition time. Those with equal ignition time were; *Bombax brevicuspe, Stemonocoleus micranthus, Cassipourea barteri, Lophira lanceolata* and *Cordia millenii* (2.33sec); *Cola laurifolia, Albizia adianthifolia* and *Gargenia imperials (3.33sec); Monodora tenulfolia* and *Rhizophora racemosa* (4.00sec). Finally, *Combretodendron macrocarpum* (1.67sec.) was the easiest to ignite while *Dichrostacys cinerea* (28sec.) was the slowest to ignite.

Keywords: Ignition time, Timbers, Combustion and Forest officers.

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INTRODUCTION

A tree is a large woody plant with main stem called trunk that does not usually branch until several feet from the ground. Trees are also perennials and taller than shrubs. It is sometimes difficult to distinguish a shrub from a tree because some plants such as *Croton* and *Baphia nitida* which usually remain as shrubs but may occasionally grow as tall as a tree. The size of a tree also varies with the climate, the depth and type of soil in which it grows [1]. Timbers are known as trees grown to be used in building or for making other things. It can be referred to as wood prepared for use in building or for making other things. Wood is the most important natural and endlessly renewable source of energy which has a major future role as an environmentally cost-effective alternative to burning fossils fuel [2]. The major role of wood is not only the provision of energy but also the provision of energy-sufficient material for our buildings and many other products. In addition, developing wood cells represent one of the most important sinks for excess atmospheric CO_2, thereby reducing one of the major contributors to global warming [3].

Ignition of wood is the start of visual and sustained combustion (smouldering, glow or flame) fueled by wood pyrolysis. Therefore, the flow of energy or heat flux from a fire or other heated object to induce pyrolysis is a necessary condition of ignition. The ignition temperature of wood is usually given as about 275^{o}C [4]. This is actually the temperature at which wood begins to decompose exothermically, that is, with liberation of heat. The speed with which combustion is initiated is dependent upon the rate of accumulation of heat at the surface. Several factors influence the accumulation: size of the piece, rate of heat loss from the surface, presence of thin outstanding edges and rate at which heat is supplied [5]. Small pieces with sharp projecting edges, such as match sticks, ignite easily because a small amount of heat is needed to raise the temperature of the whole stick to the ignition point. Large pieces, with rounded edges like poles and logs in log homes, are much slower to catch fire because conduction of heat into the interior keeps the surface below ignition temperature for sometimes.

Density and moisture content have large influence on ignition. Generally, wet wood is difficult to Ignite, thin pieces of wood ignite more easily than thick logs, and light wood species ignite quicker than heavy species. The ignition of wood products with different thickness is dependent on their thermal thickness. For various hardwood species, there is a direct relationship between ignition time and dry density [6]. The aim of this research was to determine the ignition time for the fifty two selected Nigerian timbers

MATERIAL AND METHODS

Sample Collection and Preparation

The Fifty- two (52) timber samples were collected from fourteen States in Nigeria. The States are Anambra, Enugu, Ebonyi, Imo, Delta, Edo, Cross River, AkwaIbom, Abia, Oyo, Lagos, Kano, Sokoto and Rivers State. The timber samples were obtained from the timber sheds at Nnewi, Awka, Enugu, Abakaliki and Benin. The States from where these timbers were collected were ascertained from timber dealers and confirmed by literature [7, 8]. The

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timber dealers were able to give the Local or common names of the timbers while the botanic names were obtained with the aid of forest officers and the literature [7, 8].

The samples were taken to the saw mill at Nnewi Timber Shed where each timber was cut into two different shapes and sizes. Also dust from each timber was realized. The timbers were cut into splints of dimensions 30x 1.5 x 0.5cm and cubes of dimensions 2.5cm x2.5cmx 2.5cm i.e. 15.625 cubic centimeters. The splints were dried in an oven at 105^{0}C for 24 h before the experiments.

Determination of Ignition Time (IT) of the timbers

Three oven dry splints of each timber were each clamped vertically using a tripod stand. An adjusted cigarette lighter with steady flame was used to ignite each splint at the base in a draught free room. The time taken by each splint to catch fire was recorded using a stop watch, that is, time from flame touching the splint until ignition occurs. The average time taken for ignition to occur in the three splints of each timber sample was calculated and recorded as the ignition time.

Table.1 Names of the Selected Fifty-Two (52) Timbers Used For This Research

S.No	Botanical Names	Igbo Names	Yoruba Names	Hausa Names	Areas of Location in Nigeria
1.	Monodora tenuifolia	ehuru ofia	lakesin	gujiyadanmiya	Port Harcourt
2.	Pycnanthus angolensis	Akwa-mili	akomu	akujaadi	Calabar, Awka
3.	Moringa oleifera	okwe oyibo	ewe igbale	zogallagandi	Lagos, Ibadan
4.	Protea elliottii	okwo	dehinbolorun	halshena	Nsukka
5.	Caloncoba glauca	udalla-enwe	kakandika	alibida	Onitsha
6.	Barteria nigritiana	ukwoifia	oko	idonzakara	Nsukka, Enugu
7.	Bacteria fistulosa	oje	oko	kadanya	Awka
8.	Anogeissus leiocarpus	atara	ayin	marike	Onitsha, Awka
9.	Rhizophora racemosa	ngala	egba	loko	Calabar
10.	Allanblackia floribunda	egba	eku,eso roro	guthiferae eku	Calabar, Ikom
11.	Garcinia kola	adi	orogbo	namijin-goro	Onitsha, Nnewi
12.	Glyphae brevis	anyasu alo	atori	bolukonu kanana	Calabar
13.	Hildegaridia barteri	ufuku	eso, shishi	kariya	Okigwe
14.	Sterculia oblonga	ebenebe	oroforofo	kukuki	Ibadan
15.	Cola laurifolia	ufa	aworiwo	karanga	Onitsha, Calabar
16.	Bombax brevicuspe	akpudele	awori	kurya	Ikom
17.	Bridelia micrantha	ogaofia	ida odan	kirni	Calabar, Ikom
18.	Bridelia ferruginea	ola	ira odan	kirni and kizini	Onitsha, Awka
19.	Uapaca guineensis	Obia	abo-emido	wawan kurmi	Onitsha
20.	Antidesma venosum	okoloto	aroro	kirni	Onitsha, Udi
21.	Parinari robusta	ohaba-uji	idofun	kasha-kaaji	Onitsha
22.	Cynometra vogelii	ubeze	anumutaba	alibida	Onitsha, Abakali
23.	Amphimas pterocarpoids	awo	ogiya	waawan kurmii	Umuahia, Iko
24.	Lovoa trichiliodes	sida	akoko igbo	epo-ipa	Calabar
25.	Berlinia grandiflora	ububa	apodo	dokar rafi	Enugu
26.	Albizia adianthifolia	avu	anyimebona	gamba	Enugu, Nsukka
27.	Oncoba spinosa	akpoko	kakandika	kokochiko	Onitsha
28.	Dichapetalum barteri	ngbu ewu	ira	kirni	Onitsha, Agulu
29.	Afzelia bipindensis	aja	olutoko	rogon daji	Benin
30.	Afzelia bella	uzoaka	peanut	epa	Owerri, Orlu
31.	Erythropleum ivorense	inyi	erun	idon zakara	Ogoja, Ijebu
32.	Dichrostacys cinerea	amiogwu	kara	dundu	Onitsha
33.	Pentaclethra macrophylla	ugba	apara	kiriya	Onitsha
34.	Tetrapleura tetraptera	oshosho	aridan	dawo	Onitsha
35.	Stemonnocoleus micranthus	nre		waawan kurmi	Ukpor, Awka
36.	Piliostigma thonningii	okpoatu	abafe	kalgo	Kano,Oyo
37.	Hymenocardia acida	ikalaga	orupa	jan yaro	Awka, Enugu
38.	Afrormosia laxiflora	abua ocha	shedun	don zakara	Sokoto
39.	Phyllanthus discoideus	isinkpi	ashasha	baushe	Enugu, Ikom
40.	Gardenia imperialis	uli	oroto	karandafi	Jos
41.	Macaranga hurifolia	awarowa	ohaha		Awka
42.	Sacoglottis gabonensis	nche	atala	chediya	Rivers
43.	Cassipourea barteri	itobo	odu	daniya	Eket
44.	Combretodendron macrocarpum	anwushi	akasun		Udi, Owerri
45.	Lophira lanceolata	okopia	iponhon	namijin kadai	Udi
46.	Homalinum letestui	akpuruukwu	out,obo-ako		Ikom
47.	Cordial millenii	okwe	omo	waawan kurmii	Owerri
48.	Gmelina arborea	gmelina	igi Melina	kalankuwa	Ibadan
49.	Drypetes aframensis		tafia		Ibadan
50.	Khaya ivorensis	ono	oganwo	madachi	Calabaar
51.	Spathodea campanulata	imiewu	Oruru	delinya	Onitsha
52.			Shanty		

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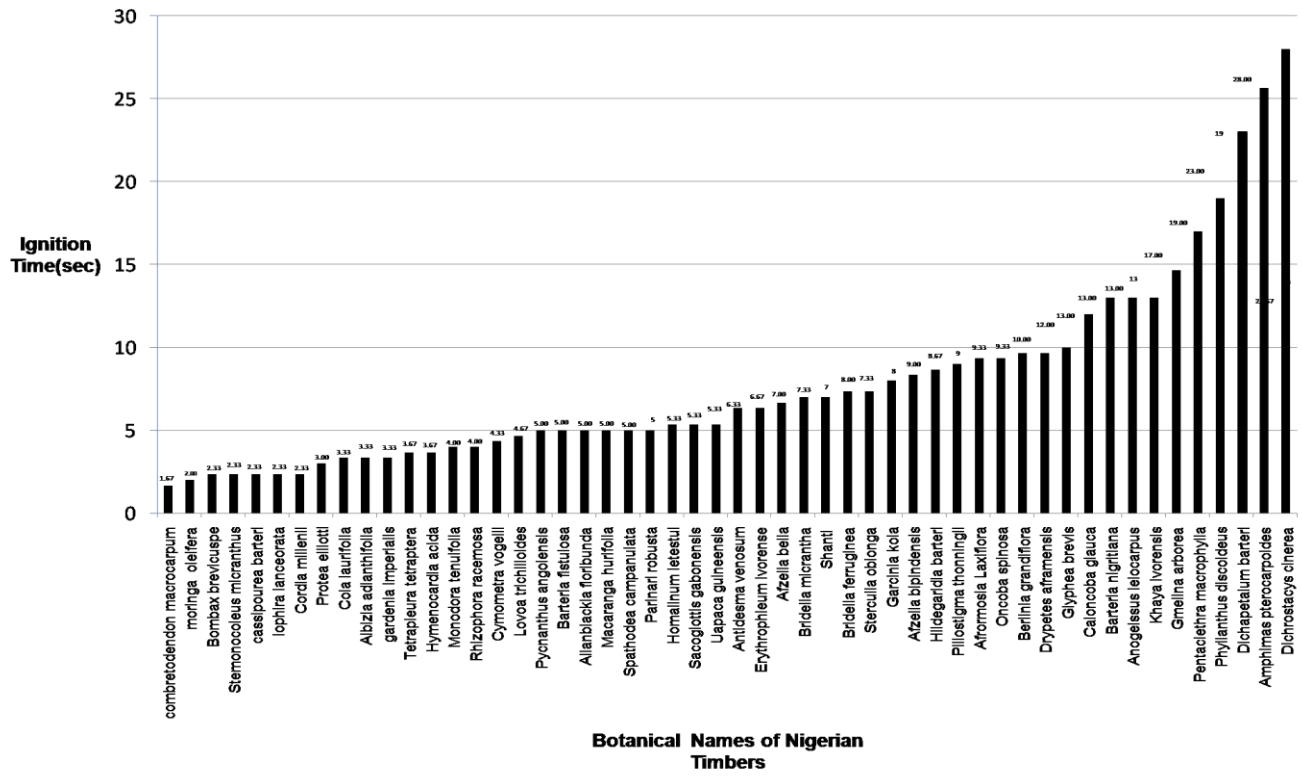
RESULTS

Fig.1A: Ignition Times of the Nigerian Timbers



The figure 1A above shows that *Combretodendron macrocarpum*(1.67sec.) had the least ignition time while *Dichrostacys cinerea* (28sec.) recorded the highest ignition time.

DISCUSSION

Figure 1A: shows the bar chart of ignition time of fifty-two Nigerian timbers. The ignition time of these Fifty-two timbers is represented in their increasing or ascending order of magnitude. The figure shows that *Combretodendron macrocarpum* (1.67sec.) recorded the least ignition time while *Dichrostacys cinerea* (28sec.) had the highest ignition time. There are some timbers with the same ignition time. Those with equal ignition time are; *Bombax brevicuspe, Stemonocoleus micranthus, Cassipourea barteri, Lophira lanceolata* and *Cordia millenii* (2.33sec.); *Cola laurifolia, Albizia adianthifolia* and *Gargenia imperials (3.33sec); Monodora tenuifolia* and *Rhizophora racemosa* (4.00sec). This observation tends to agree with those in reference [6, 7]. Combustion entails catastrophic degradation of material in the presence of air or oxygen.

CONCLUSION

In conclusion, the ignition time of *Combretodendron macrocarpum* (1.67sec) was found to be the least while that of *Dichrostacys cinerea* had the highest ignition time of (28sec).

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