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Full Length Research Paper

Extractive contents from parts of *Anthocleista djalonensis* (A) in different diameter classed-trees in parts of Rivers State, Nigeria

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The study analyzed and quantified the extractive contents of the leaves, stembarks, rootbarks and diameter classes (DCs) of woods of *Anthocleista djalonensis* and used Randomized Complete Block Design with seven treatments replicated three times. DCs of trees 3-10cm, 11-15cm and 16-25cm were measured with a diameter tape. The results of wood DCs showed significant difference (P≤0.05) between the extractive contents (ECs) of DCs: tannin ranged from 0.10% to 0.36%, flavonoid was fairly constant within 0.30% to 0.40%, saponin ranged from 5.43% to 8.56%, there was no cyanogenic glucoside in the species. Oxalate ranged from 1.60% to 2.64and alkaloid ranged 2.56% to 4.61% while results of ECs on DCs in leaf and rootbark indicated significant difference (P≤0.05: *P-v*= 0.035822) between the DCs of the leaf and rootbark: in 3-10cm DC in Tai, Eleme and Agric Farm, RSU had tannin 0.56% and 0.60% but decreased from 0.70% to 0.40% within 11-15cm DC in all locations but in Agric Farm, RSU, flavonoid showed was significance (P≤0.05: *P-v*= 0.001593): in the rootbark, flavonoid ranged from 1.89% to 2.66% in all the locations and within all the DCs while in the leaf, it ranged from 1.24% to 1.98%. Saponin showed highly significance (P<0.05: *P-value*=1.16E-10): saponin ranged from 0.60% and 1.65%, oxalate content ranged from 1.10% to 1.43% and 10.23% to 14.67% in leaf and rootbark respectively in all locations and DCs and showed very high significance (P<0.05: *P-v*=6.2E-13), phytate content in leaf ranged from 0.65% to 0.83% while in rootbark, it ranged from 0.87% to 1.56%: phytate was more in rootbark than in the leaf and indicated P<0.05:*P-value*=4.34E-05 and alkaloid ranged from 0.78% to 9.12% in the leaf while in the rootbark, it ranged from 3.67% to 4.78% but showed no significance (P>0.05:*P-value*= 0.615367). The wood of *Anthocleista djalonensis* contained anti-nutritional properties which confers durability and strength which could enhance its utilization status. Consumption in moderation of *Anthocleista djalonensis* by human is recommended since phytate content is far lower than the standard. The high extractive contents of the species could be precursors or raw materials in the pharmaceutical and chemical industries, therefore further study into this is recommended.

Keywords: Extractive contents, diameter classes, rootbark.

INTRODUCTION

Extractives are natural products extraneous to a lignocellulose cell wall; they can be removed with inert solvents such as ether, benzene-alcohol, acetone, and cold water (Akpofure, 1992). Extractives are from two sources-the first is the compounds involved in trees metabolic processes; the second is artefacts from further modification of metabolites by means other than metabolic processes of trees or other sources. The extractives formed from a tree's metabolic processes can be divided into two general categories-primary and secondary metabolites. Three groups of secondary metabolites exist in nature- nitrogen-containing secondary products, phenolic compounds and terpenes (www.google.com). Secondary metabolites are alkaloids,

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nicotine, morphine, cocaine, caffeine and glucosinolates (Nitrogen-containing secondary products), flavonoids, anthocyanins, salicylic acid and lignin (Phenolic compounds), limonoids, saponins and pinene (Terpenes) (www.google.com). The leaves of *Terminalia catappa* contain several flavonoids (such as kaempferol or quercetin), several tannins (such as punicalin, punicalagin or tercatin), saponines and phytosterols (Hynnersley 2013). Flavonoids are the most abundant phenolic components of wood extractives and bring about coloration in foliage, flowers and astringent taste in unripe fruits and are condensed tannins: tanning agents, adhesives (Cole, 2012). Extractives present in the wood are responsible for its colour, scent, its natural durability, its physical and mechanical properties (dimensional stability, acoustic properties) (Amusant *et al*., 2003).
Forest species are currently one of the major repositories of organic chemicals from wood and non-wood species which could be a precursor of many local industrial products. All wood is composed of cellulose, lignin, ash-forming minerals, and extractives formed into a cellular structure. The characteristics and amounts of these components and differences in cellular structures result in significant variations.
Common characteristics that are used to identify different woods with the naked eye come from extractives in the wood (www.google.com). Without extractives, wood would have to be identified solely by its anatomical structure. Extractives are made up of an extremely wide range of organic compounds. These chemical compounds are not part of the wood but accumulate there. The amounts and types of extractives help to determine the wood's permeability to liquids and influence other wood properties such as density, hardness, and compressive strength (Brown, 2012). Extractives give certain woods their resistance to insect or fungi attack. Many useful chemicals are made from the extractives found in trees and cause the odors and colors attributed to most wood (www.google.com). In a number of woods, such as cherry, walnut, and mahogany, the extractive colors make these woods very valuable for furniture, wood paneling, and other products (www.google.com).
Chemical constituents of wood have often dictated wood behaviour in many respects (Du Ploy, 1980: Akpofure, 1992 and Takabe *et al.*, (1995).
Anthocleista djalonensis (A) is in the family *Loganiaceae,* extends from Guinea to Nigeria is found in secondary forest, in drier areas than *A. vogelii* (Keay1964).
Anthocleista djalonensis is used in ethno-medicine for the treatment of haemorrhoid in Yorubaland (Borikini and Clement, 2012) and stomach ache, fever and purgative (Dalziel, 1955) because of the extractive content it contains. In Ogoni, the species is used in the treatment of stomach ulcers and other stomach related ailments.
The study analyzed and quantified the extractive content of the leaves, stembarks, rootbarks and diameter classes of woods of *Anthocleista djalonensis*.

MATERIALS AND METHODS

Three standing trees were selected and cut from each diameter classes of trees 3-10cm, 11-15cm and 16-25cm with a diameter tape from species of *Anthocleista djalonensis* from three locations each in NonwaTai in Tai Local Government Area, Eteo in Eleme Local Government Area all on Lat. 4.51 and Longitude 7.01^{o}E (Tariah, *et al.,* 1991) and Port Harcourt in Obio-Akpor Local Government Areas, Rivers State on Longitude 6^{o}44'N and 7^{o}33'N and Lat. 4 ^{o}38'E and 5^{o}4'E (David-Sarogoro and Ekeke, 2016).
Twigs of the leaves, debarked stem samples of bole and root were taken from the various trees, fresh, bagged, labelled and conveyed to the Department of Food Science and Technology, RSUST Port Harcourt and Department of Biotechnology, University of Port Harcourt, Choba for phyto-Nutritional (phytochemicals) analysis.

Laboratory Analysis of the Extracts

The extracts were tested for tannin, flavonoids, saponin, cyanogenic glycosides, oxalate, phytate and alkaloid based on development of colouration and precipitation upon addition of certain chemical reagents Folin-Denis reagent methanol to the plant parts extracts.

Test for Tannins

0.5g of the dried powdered samples was boiled in 20ml of water in a test tube and then filtered. A few drops of 0.1% Ferric Chloride were added and observed for brownish green to a blue-black coloration confirmed the presence of tannins to the method described by Makker *et al.* (2002).

Test for Flavonoids

This test was done as described in Pamar *et al.* (2012). 5ml of 10% dilute Ammonia solution was added to a portion of the aqueous liquor of the plant extracts, followed by addition of concentrated H_2S0_4. A yellow coloration observed in the extract indicated the presence of flavonoids.

Test for Saponin

This was done using foam test as 1ml solution of extract was diluted with distilled water to 20 ml and shaken in a graduated cylinder for 15 minutes. Development of stable foam suggests the presence of saponins.

Test for Glycosides

According to Khandelwal (2000), 5ml of the extracts were treated with Glacial Acetic acid containing drops of 0.1% Ferric Chloride solution (0.1%). This under large with 1ml of concentrated H_2S0_4. A browning of the interface suggested a deoxyl sugar characteristics of glycoside with a violet ring may appear while in the acetic layer a greenish ring may form gradually.

Test for Oxalate

As specified in the specifications monograph 16 of FAO, 2019, two grams of sample put in 4 ml of water; added 3 ml concentrated hydrochloric acid and then 1g of granulated zinc and heated for 1 min in a boiling water bath. The mixture stood for 2 min at room temperature and supernatant solution was decanted into a test tube containing 0.25 ml of a 1% solution of phenylhydrazine hydrochloride. Mixture was boiled and cooled immediately. The solution was transferred into a glass cylinder with a ground glass stopper and added an equal volume of concentrated hydrochloric acid. 0.25 ml of a 5% solution of potassium hexacyanoferrate (III) was mixed well and allowed to stand for 30 mins. The absorbance at 520 nm in 10 mm cell was measured. The absorbance was not more than that of a standard solution, prepared in the same manner, using 1 ml of oxalic acid standard solution (prepared by dissolving calculated amount, in mg, equivalent to the limit specified for oxalic acid or oxalic acid dihydrate in 1000 ml of deionized water) diluted with 3 ml of deionized water.

Test for Phytate: 0.5M of HCl was used with 0.5M NaOH and Ferric Chloride (0.25% w/v), digestion reagents in 12.5 to digest the extract and colorimetric reagents and standards as for phosphorus in 32.4. Phytic acid formed was isolated as ferric phytate was recovered, digested and estimated as phytate-phosphorus (Harborne,1989).

Test for alkaloids

The presence of alkaloids in the plant extract was tested with Wagner`s reagent following the procedure described by Sabri, *et al*. (2012). Ten ml of the extract was evaporated to dryness. Two ml of 2% HCl acid solution was added to the dry residues. Formation of reddish brown precipitation indicated the presence of alkaloids.

Experimental Design and Data Analysis

A Randomized Complete Block Design (RCBD) with seven treatments replicated three times was used. Descriptive statistics were used where necessary; data were analyzed using two-way analysis of variance (ANOVA).

RESULTS AND DISCUSSION

Phytochemicals of the Wood of *Anthocleista djalonensis*

The results of extractive content of the wood showed that there was significant difference ($P \leq 0.05$) between the diameter classes and axial direction as tannin ranged from 0.10% to 0.36% increasing from top to bottom in Tai but inconsistent in Eleme where top had the highest tannin-0.36% but decreased axially to 0.27% within 3-10cm DC and remained constant amongst the other DC of 11-15cm and 16-25cm. (Table 1). Flavonoid was fairly constant within the range of 0.30% and 0.40% in all DC and axially. Saponin ranged from 5.43% to 8.56% but was inconsistent with highest quantity at the tops of the DC: 5.6%, 6.5% and 7.1% within 3-10cm, 11-15cm and 16-25cm respectively and decreased to middle and bottom in Tai. Similarly, in Eleme and Agric farm, RSU Saponin was also highest at the tops-6.5%, 5.43% and 8.53%: 7.45%, 6.54% and 8.56% within 3-10cm, 11-15cm and 16-25cm respectively (Table 1). This result agrees with Hynnersley (2013) that found in leaves of *Terminalia catappa* several flavonoids (such as kaempferol or quercetin), several tannins (such as punicalin, punicalagin or tercatin), saponins and phytosterols. There was no cyanogenic glucoside in the species. Oxalate was inconsistently present in all DCs and axially. Percentage phytate was almost constant within the DCs and along the height of the species %: ranged from 1.23% to 1.54% (Table 1). Alkaloid ranged 2.56% to 4.61% and was highest at the tops among the DCs but decreased axially to the bottom. Generally, EC fluctuates from the top to bottom and across all the diameter classes (Table 1).

Effects of Diameter Classes on EC in leaf and rootbark of *Anthocleista djalonensis* at various locations

Tannin: The results showed that there was significant difference ($P \leq 0.05$: $P\text{-}v = 0.035822$) between the DCs of the leaf and rootbark: in 3-10cm DC in Tai, Eleme and Agric Farm, RSU had tannin 0.56% and 0.60% but decreased from 0.70% to 0.40% within 11-15cm DC in all locations but in Agric Farm, RSU, tannin was constant 0.54% while tannin of rootbarks of *Anthocleista djalonensis* within 3-10cm was the same at Tai and Agric Farm (0.85%) but highest at Eleme with 0.94% and 1.12% within11-25cm and 16-25cm respectively (Figure 1).

The average value of tannin of 0.54% observed in species was far below 1.53% and above 1.74% of *Collomia linearis* and *Artemisia rothrockii* respectively found by Zafar (2015). This tannin *Athoclest adjalonensis* may be good for human consumption since high consumption of tannin may be harmful to health as reported by Oakenfull and Sidhu (1990). This is because protein digestibility by tannins have adverse effects due to the formation of complexes (Sathe *et al*., 1984) in human. In wood it may cause localized twisting of cell wall as a result of coagulation of chemical reaction constituents of wood on drying. Tannin occurs in mangrove particularly in *Rhizophora mangle* bark contains 22-23 % tannin (Hill, 1951). Consequently, coastal villages in the Niger Delta, some fishermen

Table 1. Extractive content of *Anthocleista djalonensis* wood.

Location	Diameter Class (cm)	Axial Direction	% Tannin	% Flavonoid	% Saponin	% cyanogenic glucoside	% Oxalate	% Phytate	% Alkaloid
TAI	3-10cm	Top	0.25	0.4	5.6	0	2.2	1.23	4.34
		Middle	0.24	0.34	2.1	0	2.45	1.23	3.45
		Bottom	0.21	0.45	2.8	0	1.98	1.43	3.12
	11-15cm	Top	0.1	0.35	6.5	0	2.34	1.23	4.23
		Middle	0.2	0.36	2.4	0	2.56	1.24	3.12
		Bottom	0.3	0.38	3.8	0	1.56	1.23	3.12
	16-25cm	Top	0.3	0.3	7.1	0	2.32	1.24	4.88
		Middle	0.3	0.3	2.7	0	2.64	1.24	3.2
		Bottom	0.36	0.36	3.7	0	2.17	1.24	3.28
Eleme	3-10cm	Top	0.36	0.36	6.5	0	2.34	1.25	4.56
		Middle	0.31	0.35	2.3	0	2.56	1.26	4.43
		Bottom	0.27	0.38	1.45	0	3.23	1.26	3.65
	11-15cm	Top	0.21	0.34	5.43	0	2.56	1.65	4.33
		Middle	0.23	0.35	2.5	0	2.65	1.56	4.61
		Bottom	0.25	0.36	2.45	0	2.6	1.23	3.12
	16-25cm	Top	0.23	0.35	8.53	0	2.65	1.23	3.45
		Middle	0.23	0.37	6.45	0	2.33	1.43	3.45
		Bottom	0.26	0.46	2.1	0	1.43	1.56	3.56
Agric Farm, RSU	3-10cm	Top	0.1	0.35	7.45	0	2.1	1.54	2.34
		Middle	0.1	0.38	6.5	0	1.76	1.54	3.43
		Bottom	0.1	0.38	5.43	0	2.1	1.54	3.54
	11-15cm	Top	0.1	0.34	6.54	0	2.54	1.32	4.23
		Middle	0.2	0.35	4.32	0	3.45	1.36	4.54
		Bottom	0.3	0.37	6.34	0	2.12	1.23	4.56
	16-25cm	Top	0.2	0.45	8.56	0	3.23	1.45	3.24
		Middle	0.25	0.43	5.45	0	2.1	1.46	2.56
		Bottom	0.25	0.56	7.56	0	1.6	1.47	3.67

purported used mangrove leaves in protecting and preserving their nets and other gears from termites attack and other agents of biodeterioration (Etukudo, 1984). Tannins precipitate proteins in hides and skins stopping the growth of bacteria thus producing a material that is both strong and supple and remains so for many years as preservative (Etukudo, 1984). In some parts of coastal villages in the Niger Delta, some fishermen purported that mangrove leaves are used in protecting and preserving their nets and other gears from termites attack and other agents of biodeterioration.Tannins have astringent properties which hasten the healing of wounds and inflamed mucous membranes (Okwu, 2006).

Flavonoid: The result on the flavonoid analysis showed that there was significant difference between DCs ($P \leq 0.05$: *P-v*= 0.001593) (Table 2). In the rootbark, flavonoid ranged from 1.89% to 2.66% in all the locations and within all the DCs while in the leaf, it ranged from 1.24% to 1.98% (Figure 2). It implies that flavonoid was more in the rootbark than in the leaf.

Flavonoids are potent water-soluble antioxidants and free radical scavengers which prevent oxidative cell damage and have strong anticancer activity (Salah *et al.,* 1995, Okwu, 2004). Flavonoids in intestinal tract lower the risk of heart disease. As antioxidants, flavonoids from these plants provide anti-inflammatory activity (Okwu, 2004).

Saponin

Highly significance ($P<0.05$: *P-value*=1.16E-10) was observed amongst various DCs and locations, which implies there was both diameter class and location effects.

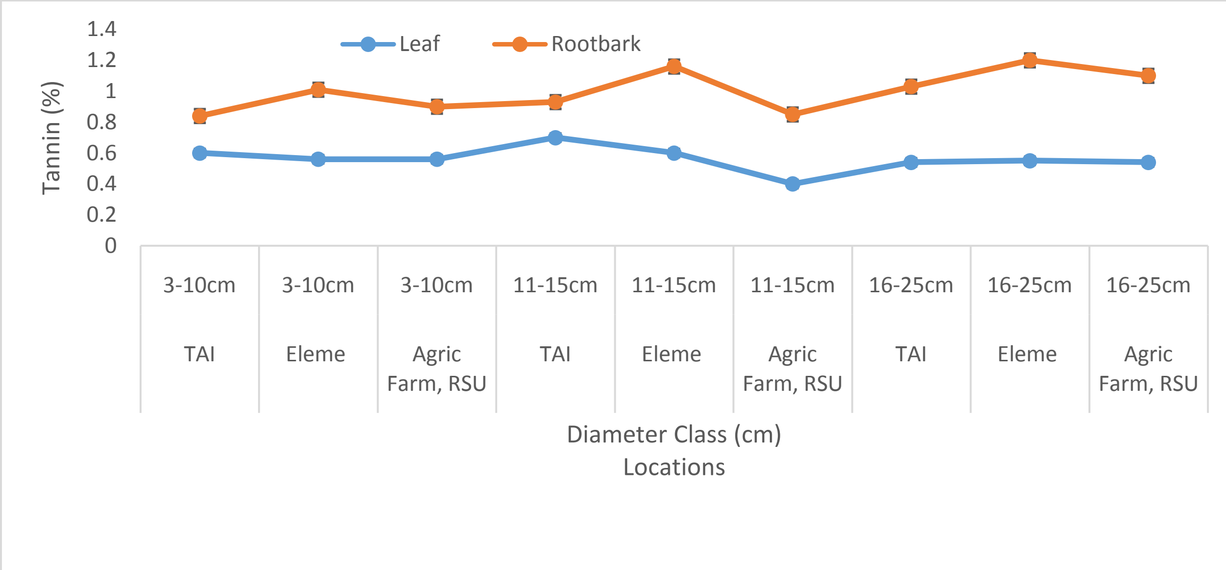

Fig. 1. Effects of Diameter Class on Tannin leaf and rootbark of *Anthocleista djalonensis* at various locations.

Table 2. Summary of Analysis of Variance (ANOVA) among Extractive Contents of *Anthocleista djalonensis* Leaf and Root bark.

Extractive Contents	*F-Stat*	*P-value*	*F-critical*	*Significance (P<0.05)*
Tannin	5.586207	0.035822	4.747225	Reject Ho*
Flavonoid	16.45218	0.001593	4.747225	Reject Ho*
Saponin	413.032	1.16E-10	4.747225	Reject Ho*
Cyanogenic Glucoside	0	0	0	^{ns}Accept Ho
Oxalate	1002.763	6.2E-13	4.747225	Reject Ho*
Phytate	38.9029	4.34E-05	4.747225	Reject Ho*
Alkaloid	0.266046	0.615367	4.747225	^{ns}Accept Ho

Keys: Ho=Null hypothesis, *significant difference at P<0.05, ns-not significant difference at P>0.05

Saponin ranged from 0.60% and 1.65%: the highest at Agric farm within the 16-25cm DC with 1.65% in the leaf, while in the leaf, it ranged from 14.67% to 23.45% (Figure 3). The high significance and values above 4.51% of saponin content in rootbark agrees with (Zahr *et al.,* 2015). This study partly disagrees with Owolabi *et al*. (2012) that observed lower saponin content.

Saponin taste is irritating and bitter which reduces its use as feed material (Oleszek *et al*., 1994). In the present work, higher saponins contents observed the data collected by Ogbe and Affiku (2012). The rootbark of *Anthocleista djalonensis* contains very high saponins which may pose serious hazard to human. Hypocholesterolemia may be caused: is a disease, which is caused by saponins. Hypocholesterolemia is caused as it binds with cholesterol in order to reduce its assimilation (Soetan and Oyewole, 2009).

Saponins are of the terpenes group-Heterogeneous group and composed of triterpenoid or steroid glycone moiety and complex oligosaccharide substituent. It has hydrophillic properties of the glycoside part and lipophilic properties of the aglycone part give saponins, amphiphilic or surfactant properties- ability to form stable aqueous foams to form complexes with members of steroids and lipid compound. Partial destruction of the membranous structure for instance heamolyzes RBC- membrane-interacting properties potential toxic properties or specific biological effects (www.google.com/extractives).

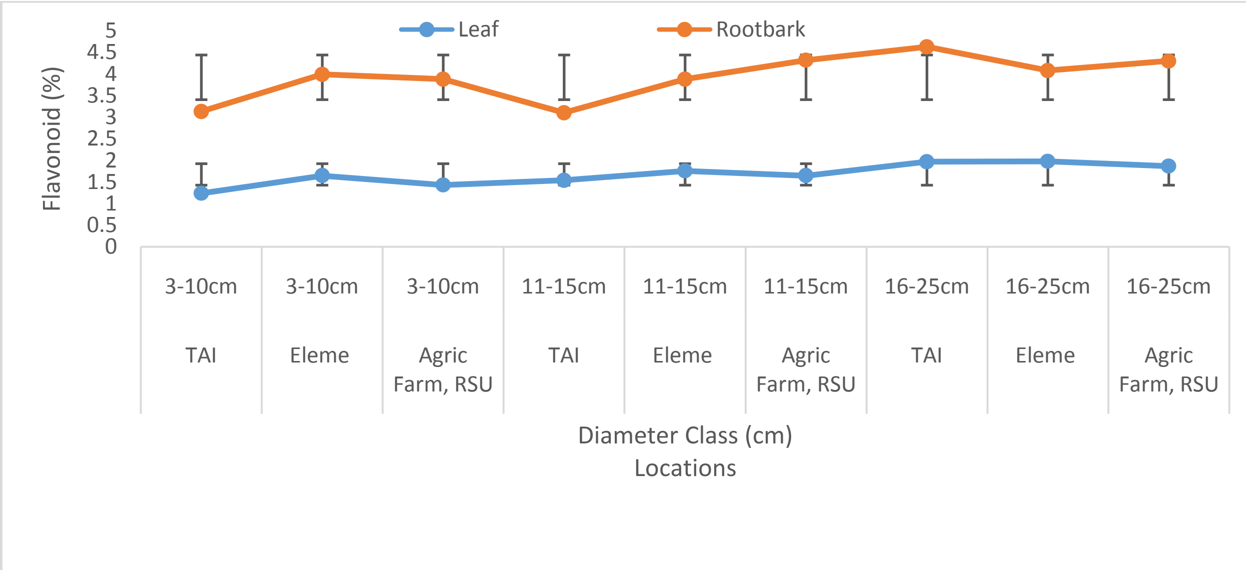

Fig. 2. Effects of Diameter Class on Flavonoid leaf and rootbark of *Anthocleista djalonensis* at various locations.

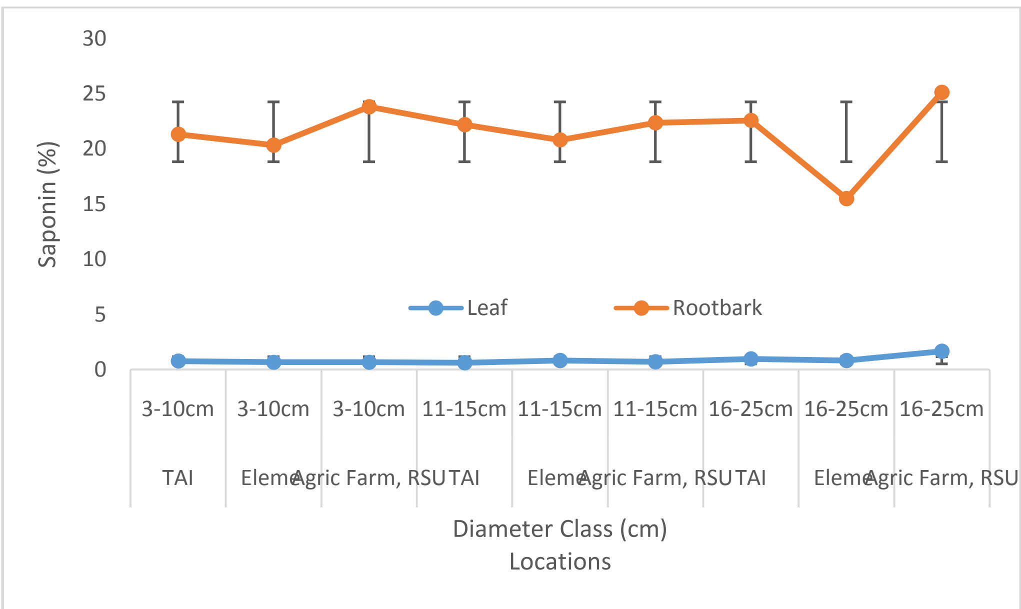

Figure 3. Effects of Diameter Class on Saponin leaf and rootbark of *Anthocleista djalonensis* at various locations.

Saponins have antiviral and antifungal properties as it possesses the ability of the molecules to combine with sterols in fungal membrane and cause pore formation and loss of membrane integrity (www.google.com/extractives).

Cyanogenic Glucoside

There was no presence of cyanogenic glucoside in all parts of the species from all sampled locations and DCs.

Oxalate

The oxalate content ranged from 1.10% to 1.43% and 10.23% to 14.67% in leaf and rootbark respectively in all locations and DCs (Figure 4). This finding disagrees with Zahr et al., (2015) that oxalate contents ranged from 0.48-0.73% of whole plant species. Oxalate content showed very high significance ($p<0.05$: p-v=6.2E-13). The variation and inconsistency may cause this significance.

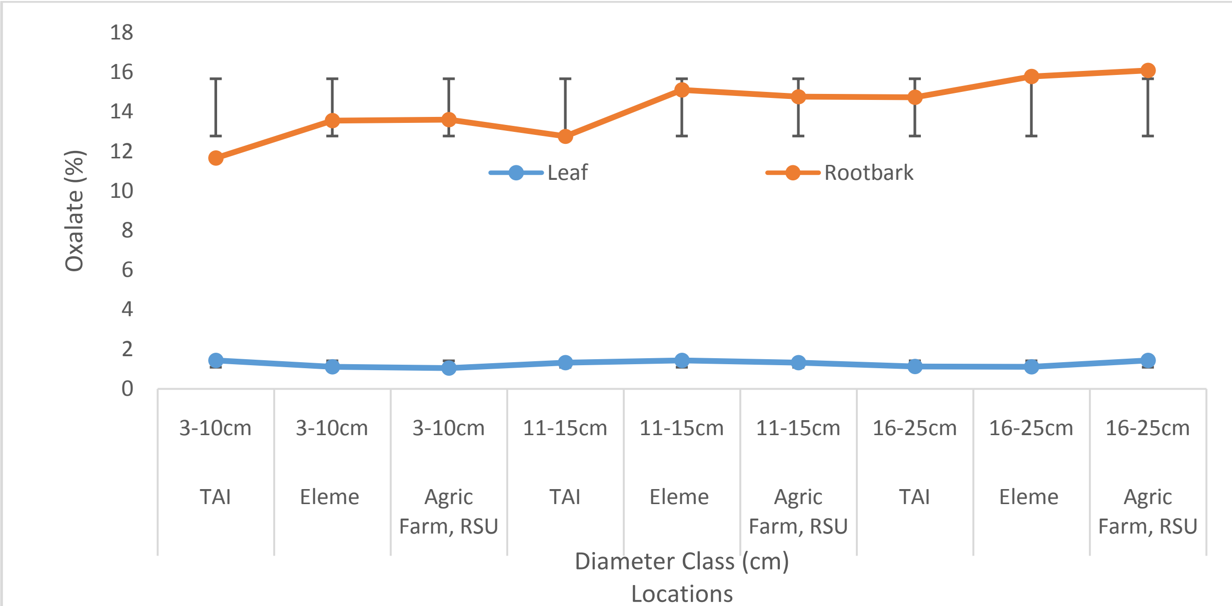

Fig. 4. Effects of Diameter Class on Oxalate of leaf and rootbark of *Anthocleista djalonensis* at various locations.

This finding of oxalate contents were found to be higher than findings by Amata and Iwelu (2012), Owolabi *et al*. (2012) and Zahr *et al.,* 2015. Plant nutrients availability is negatively affected by polyphenols, phytates and oxalate which make nutrients unavailable by forming complex with bivalent ions like Ca2+, Zn2+, Mg2+ and Fe2+ (Aletor and Omodara, 1994). Phytic acid and oxalic acid are generally present in plants and these are anti-nutritional factors that affect minerals availability (Osagie and Eka, 1998).

Phytate

The phytate content in leaf ranged from 0.65% to 0.83% while in rootbark, it ranged from 0.87% to 1.56%: phytate was more in rootbark than in the leaf (Figure 5). The values of phytate content in this finding were lower than findings of Zahr et al., (2016) that concentration of phytate varies from 3.39-7.09% in *Brassica rapa* and *Monarda punctata* plant species. Phytate content showed highly significance ($p<0.05$:p-value=4.34E-05) Phytate is actually the organically bounded form of phosphorus as it binds with various minerals such as magnesium, calcium, zinc and iron and thus causing increase in the mineral deficiency in digestive tract of animals (Bello *et al*., 2008). High concentration of phytate and oxalate greatly lower the ability of intake of minerals in animals (Butler, 1989). The consumption in moderation of *Anthocleista djalonensis* by human is recommended since phytate content is far lower than the standard.

Alkaloid

Result on alkaloid indicated more in rootbark than in the leaf, though there was no significance ($P>0.05$: *P-value*= 0.615367) disagrees with Zahr *et al.,*(2015) that observe highly significance shown by alkaloid content in *Erigeron divergens* and *Capsella bursa-pastoris* plant species. Alkaloid ranged from 0.78% to 9.12% in the leaf while in the rootbark, it ranged from 3.67% to 4.78% (Figure 6). This study disagrees with Zahr *et al.,* (2015) that found lower concentration of alkaloid ranged from 0.63-0.93% in all plant species studied. The negative effects on human as Glyco-alkaloids caused the hemolysis and toxicity in human (Saito *et al.,* 1990); Aletor, 1990), may cause infertility in human (Olayemi, 2007). In animal, some types of alkaloids show very dangerous effects on animals as development of fetal in sheep could be affected by alkaloids and sometimes leads to the death of fetal (Zahr *et al.,* 2015). Mostly the teratogenic alkaloids are responsible for the irregularities in fetal (Mulvihill, 1972).

Table 2: Summary of Analysis of Variance (ANOVA) among Extractive Contents of *Anthocleista djalonensis* Leaf and Rootbark

The high EC in *Anthocleista djalonensis* confers on the species resistance to pest, insect and pathogenic attack confirming personal communication with the sawyer on the resistance of the species to insect, rot and other bio-deteriorating agents. This finding agrees with Witzell (2008) that phenolic metabolism and phyto-chemistry are often activated by pathogen attacks but provides natural and ecological implication on systemic resistance in conifers. Trees have various mechanisms of defense such as com-

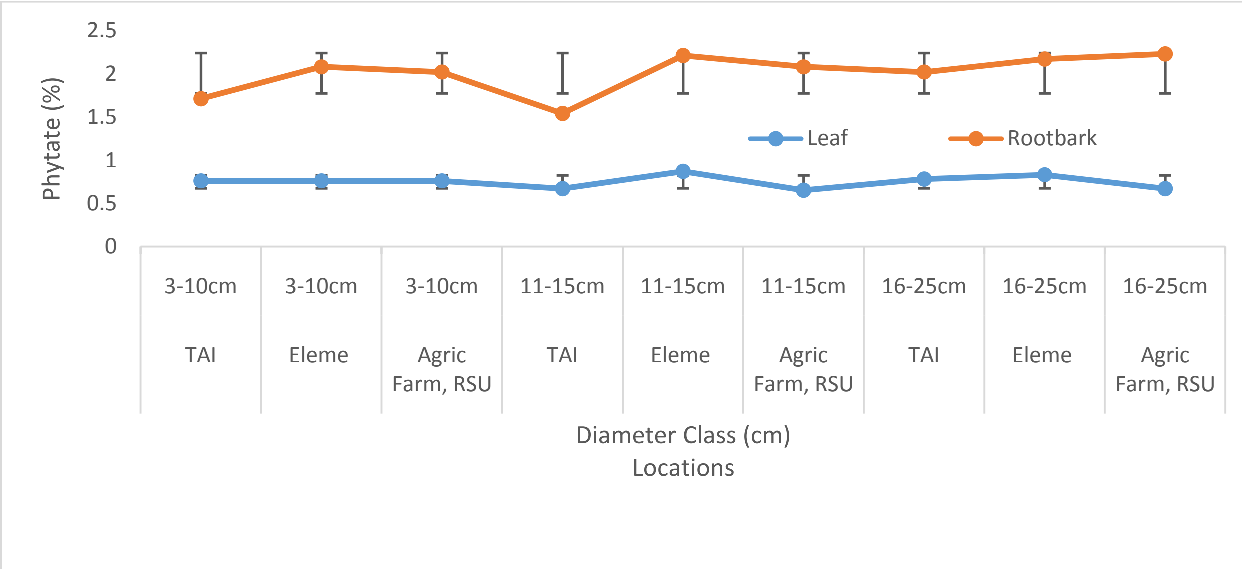

Fig. 5. Effects of Diameter Class on Phytate of leaf and rootbark of *Anthocleista djalonensis* at various locations.

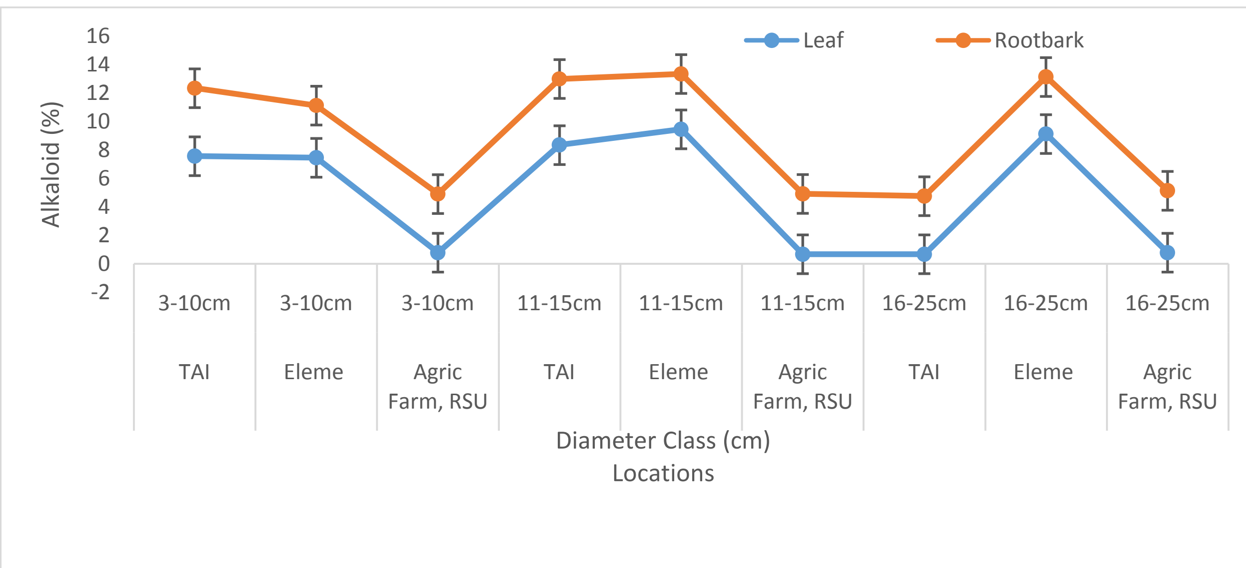

Fig. 6. Effects of Diameter Class on Alkaloid.

partmentalization, tyloses and gummosis against human-induced injuries, pests, pathogens and other attacks in which exudation of phenolic and complex compounds play major roles. The high extractive content produced a peculiar odor and dulled and blunted the blade and saws used in cutting the wood which is due to the presence of alkaloids and chemical reactions between the metal blade and the phenolic compounds.

Consequently, high extractive content confers durability, appearance and increases strength of wood because of the bulking effect on the wood (Jozsa and Middleton, 1995). The presence of ECs in *Anthocleista djalonensis* observed in the species shows that it is a good source of antioxidants. Saponins can reduce cholesterol control human cardiovascular disease (www.reseachgate.com).

Extractive content decreases axially (top to bottom), highest at top and lowest at bottom in all the diameter classes in all the locations except in Eleme, Tai and bottom UST in 3-10cm class which agrees with Erddman, *et al.,* (1951) that extractive content variation follows a geographical pattern. This also confirms with Akpofure (1992) that extractive content of the bark of mangrove species growing in different localities have been found to vary markedly. The high extractive content increase with decrease height agrees with Anderson (1962). Anderson and Zavarin, (1964) also observed large increases in extractive content with decrease in height.

High EC increase in 3-10cm diameter class agrees with the amount of extractives in old trees have been found to be more than that in the young trees of *Tectonagrandis* Da Costa *et al.*, (1958) .This finding agrees with Abulude *et al.* (2010) that the stembark of *Anacardium occidentale* extract showed significantly highest tannin and contains potentials for use as medicinal plant.

CONCLUSION

This study has found that ECs increased from the top to bottom along the bole (axially) disproportionately amongst the DCs with few exceptions which might be attributed to location, genetic and other factors. The wood of *Anthocleista djalonensis* contained anti-nutritional properties which confers durability and strength which could enhance its utilization status especially in carpentry-casing, base, ceiling, paneling and others. The high extractive contents of the species could be precursors or raw materials in the pharmaceutical and chemical industries, therefore further study into this is recommended. The consumption in moderation of *Anthocleista djalonensis* by human is recommended since phytate content is far lower than the standard. Generally, this species showed high potentials for use as medicinal plant because of the presence of different phytochemicals.

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