Phytochemical Screening for Bioactive Chemical Constituents in *Detarium microcarpum* Guill & Perr Stem Bark.

[1]Reuben, K. D. and [2]Jada, M. Y.

[1]Department of Basic Sciences,Adamawa State College of Agriculture, P M B 2088, Ganye, Nigeria.
[2]Department of Crop Protection, Modibbo Adama University of Technology, P M B 2076, Yola, Nigeria.
datsureuben@yahoo.com;

Abstract: Stem bark of *Detarium microcarpum* Guill & Perr was collected, gabbled and shredded. This material was air dried and then subjected to gradient soxhlet extraction using ethylacetate, methanol and distilled water respectively. This yielded 110.00g of light brown powder for ethylacetate, 208.00g of light brownish shiny powder for methanol and 62.80g of dark brown shiny crystals for water extract respectively. The aim of this study was to investigate for the phytochemicals present in the extracts, thus, they were examined using the standard phytochemical screening procedures.This revealed high concentration of terpenoids in ethylacetate and methanol extracts as well as cardiac glycoside in ethylacetate. However, cardiac glycoside also showed moderate presence in methanol and low concentration in aqueous extracts respectively. There is also the general moderate presence observed of carbohydrates, tannins and flavonoids in all the extracts. [Reuben, K.D., Jada, M.Y. **Phytochemical Screening for Bioactive Chemical Constituents in *Detarium microcarpum* Guill & Perr Stem Bark.** *Nat Sci* 2013;11(5):91-94]. (ISSN: 1545-0740). http://www.sciencepub.net/nature. 14

Key words: Phytochemical, Constituents, *Detarium microcarpum*, Stem Bark.

Introduction

The history of the use of herbal medicine may be as old as the history of man-kind (Reuben, *et al*., 2010). Usman and Osuiji, (2007) has reported that "The use of plants as medicine is an ancient practice common to all societies, especially African society", of which the Kilba community of Hong Local Government area of Adamawa State is not left out in the use of *Detarium microcarpum* Guill &Perr stem and root barks as a remedy for infant ailment Gedigedi or Tando(Hausa), stomach aches, wound etc., the fruit is also eaten.

Detarium Microcarpum Guill & Perr, synonym *Detarium senegalense* Gmel, English name Tallo tree belong to the family *Caesalpinoideae* and tribe of *Detarieae*, related to *Copaitera* (Arbonnier, 2004., Kouyarte and van Damme, 2008). It is also known as Taura and *Kwakuragwahiu i*n Hausa and Kilba languages.

Detarium microcarpum as reported by Arbonnier, 2004 and Kouyate and van Damme, 2008 is a small tree up to 10m high, crown rather than dense and spherical. *D. microcarpum* flowering period is the rainy season and it inhabits Sudanese and Guinean Savannahs, dry forest, fallow land, from Senegal through Nigeria to Cameroon in west Africa, and as far as Sudan.

Reported medicinal applications of *D. microcarpum* by van Damme, 2008 are: the bark, leaves and roots widely used throughout its distribution areas because of their diuretic and astringent properties. They are prepared as infusions or decoctions to treat rheumatism, venereal diseases, urogenital infections, stomach ache, intestinal worms and diarrhea including dysentery. The fresh bark or leaves are applied to wounds, to prevent and cure infections. The stem bark decoction or infusion is used in northern Nigeria to treat infant ailment known as *Gedigedi* or *Tando* in Hausa. The great potentials as reported by Arbonnier, 2004 and van Damme, 2008 of D. microcarpum,coupled by further report by Kouyate and van Damme, 2008 that despite the numerous medicinal applications of this herbal plant, phytochemical analysis on it are scarce, and thus, deserve more attention. This has thus arose the need for the phytochemical analysis of this noble herb, with the view to give scientific validation to these wide folk-low medicinal applications of it and thus, the aim of this research was to do gradient extraction of the stem bark and using the standard procedures of analysis, analyze for the phytochemical bioactive constituents, as this will provide credibility for the wide application of this plant in folk-low medicine for its antibacterial, antihelminth,wound healing and curative properties.

Materials and methods

The plant parts, leaves, fruits and stem bark of *Detarium microcarpum* Guill & Perr were collected in July 2012 at longitude 8^{o} $31^{/}$ $15^{//}$ N and latitude 12^{o} $7^{/}$ $44^{//}$ E, Nyibango, Ganye, Adamawa State which was authenticated by Peter Mnama and Patrick Boni of the departments of Basic Sciences and Forestry Technology of Adamawa State College of Agriculture Ganye, Nigeria. A voucher specimen with No. 072012L1F2 were deposited in the

department of Forestry Technology of Adamawa State College of Agriculture Ganye, Nigeria.

Preparation and extraction of plant material

The stem bark of *D. microcarpum* was collected and gabbled for removal of adulterants and then pulverized using wooden pestle and mortar. It was air dried at room temperature for seven days and one thousand grams (1000g) of the pulverized part was exhaustively and sequentially extracted using petroleum ether, ethylacetate, methanol and distilled water respectively with soxhelet extractor(gradient extraction) (Geidam, et al., 2007; WHO, 2000). Fig. 1.

Detarium microcarpum Guill & Perr. Dried Poundered Stem bark (1000g).

- Stem bark (1000g)
- Petroleum ether extraction yielded nothing.
- Ethylacetate extreact: light brown powder, 110.oog
- Methanol extract: brown shiny powder, 208.00g
- Aqueous extract: dark brown shiny crystals, 62.80g

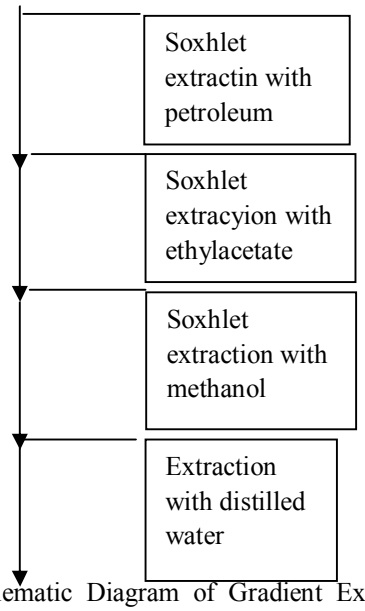

Fig. 1: Schematic Diagram of Gradient Extraction and Extract Fractions of *Detarium microcarpum* Stem Bark in Organic and Aqueous Solvents.

The extracts were concentrated *in-vacuo* and coded "EAE" for ethylacetate, "MTE" for methanol and "AQE" for aqueous extracts respectively. All work were carried out in accordance with the general guidelines for methodologies on research and evaluation of traditional medicine (WHO, 2000; Trease and Evans, 2002; Geidam*, et al*., 2007 and Reuben*, et al*., 2012). The petroleum ether did not wash out anything at all. The extracts were then stored aseptically in sterilized sample bottles until use.

Phytochemical Screening

The crude ethylacetate extract (EAE), methanol extract (MTE) and aqueous extract (AQE) were investigated for the presence of bioactive phytochemical constituents, using the standard procedures by Brain and Turner, 1975; Silver, *et al*., 1998 and Trease and Evans, 2002 respectively.

Results and Discussion

Table 1, shows the result of the extraction of *D. microcarpum* Guill & Perr stem bark. This reveals the various extract fractions obtained by color, form, weight in grams and the percentage yield weight (w/w) respectively.

Table 1: The yields of the various extrats of *Detarium microcarpum* Guill & Perr stem bark.

Parameters	Various extracts		
	Ethylacetate :	methanol :	aqueous/ distilled water
Color	light brown :	brown :	dark brown
Form	powder :	shiny powder :	shiny crystal
Extract weight(in g)	110.00 :	208.80 :	62.80
%yield(w/w)	11.00 :	20.80 :	6.28

NB: Mass of the plant sample dried to constant weight used was 1000.00g

The ethylacetate extract (EAE) was light brown in color, powder in nature and weigh 110.00g, equivalent to 11.00% w/w, while the methanol extract (MTE) was brown shiny powder, which weighed 208.00g, equivalent to 20.80% w/w and the aqueous extract (AQE) or distilled water was a beautiful dark brown shiny crystal that weighed 62.80g which was equivalent to 6.28% w/w respectively.

Table 2 shows the result of the phytochemical screening for bioactive constituents of the various extracts of *D. microcarpum*.

The search for new antimicrobial agents from plant source is an important line of research, because of the resistance acquired by several pathogenic micro-organisms (Usman, *et al*., 2007). The phytochemical screening of the various crude extracts of *D. microcarpum* reveals the high and moderate concentrations of terpenoids, cardiac glycosides, tannins, flavonoids and carbohydrates, some of which compounds especially flavonoids, tannins, cardiac glycosides and tarpenoids have been reported to have antimicrobial and curative properties (Nweze, *et al*., 2004; Hassan, *et al*., 2004; Sartoratto, *et al*., 2004; Usman, *et al*., 2005; Nwaogu, *et al*.; 2007 and Usman, *et al*., 2007). The presence of these bioactive plant constituents in moderate concentration in all the extracts of *D. microcarpum*, and the reports about their antibacterial/antimicrobial and curative properties against pathogenic micro organisms would give credibility and bases for the wide use of this plant in folk-low medicine as treatment for the infant ailment Gedigedi or Tando and wound healing properties and host of other medicinal uses of this plant as reported by Arbonnier, 2004 and Kouyate and van Damme, 2008 and other oral reports of the plant from its distribution areas.

Table 2: Phytochemical analysis of the various extract fractions of the stem bark plant sample of *Detarium microcarpum* Guill & Perr for bioactive constituents.

S/No.	Bioactive constituents and Test	EAE	MTE	AQE
1.	Alkaloids			
	I. Dragendroff's test	-	-	-
	II. Mayor' test	-	-	=
2.	Carbohydrates test			
	I. General test (molisch's test)	++	+	=
	II. Monosaccharide (barford's test)	-	-	-
	III. Fehling test (free reducing sugar)	++	++	++
	IV. Combined reducing sugar	++	++	+
	V. Test for ketoses (salivanoff's test)	=	+	-
	VI. Test for pentoses	+	+	=
3.	Test for soluble starch	+	+	-
4.	Test for tannins			
	I. Ferric chloride test ($FeCl_3$)	+	++	++
	II. Lead acetate test	++	++	+
5.	Test for phlobatannins	-	+	+
6.	Test for Anthraquinone glycosides			
	I. Free Anthraquinone	-	-	-
	II. Combined anthraquinone	-	-	-
7.	Test for cardiac glycosides			
	I. Salkowski test	+++	++	+
	II. Liebarman-Burchard test	++	+	-
8.	Saponins glycoside			
	I. Frothing test	-	-	-
9.	Test for flavonoids			
	I. Shinoda's test	+	++	+
	II. Ferric chloride test ($FeCl_3$)	+	++	++
	III. Lead acetate test	++	++	+
	IV. Sodium hydroxide test	-	=	-
10.	Test for Terpenoids	+++	+++	+

Key.
EAE. Ethylacetate extract
MTE. Methanol extract
AQE. Aqueous extract
_. Completely absent

CONCLUSION

This study therefore provides credence and basis for the wide use reported of this plant folkloric ally for its uses as a medication to treat the infant's ailment Gedigedi or Tando as well as its use in wound healing and other various uses. It also justifies the wide folkloric uses and claims about the therapeutic values of this herbal plant as curative agent. Further studies are however, encouraged in order to characterize and elucidate the structures of the phytochemical constituents with the view to obtaining a more useful chemical agents with greater efficacy against bacterial ailments as well as to be used by pharmaceutical industries as starting material to synthesize chemical agent that may have greater therapeutic value.

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CORRESPONDING AUTHOR

Reuben, K. D.
Department of Basic Sciences ,Adamawa State College of Agriculture, P M B 2088, Ganye, Nigeria.
+2348054805698, +2347083359820
E-mail: datsureuben@yahoo.com;

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