



The Chemical Evaluation And Anti-Microbial Screening Of Extracts From Seeds And Leaves Of *Telfairia Occidentalis* (Fluted Pumpkin)

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Abstract The phytochemical screening of seeds and leaves of *T. occidentalis* indicates the presence of; alkaloids 1.2% and 1.5%; tannins 6.0% and 3.4%, saponins 7.5% and 7.7%, flavonoids 9.0% and 10.0%, terpenoids 8.0% and 2.6%, steroids 6.2% and 8.2% and cardiac glycosides 0.8% and zero percent respectively while nutritive elemental constituents in the seeds and leaves of *T. occidentalis* were Potassium(K) 8.54ppm and 23.76ppm, Iron(Fe) 35.00ppm and 7.22ppm, Sodium(Na) 66.00ppm and 7.22ppm, Calcium(Ca) 29.70ppm and 12.62ppm, Magnesium(Mg) 48.90ppm and 17.13ppm Zinc(Zn) 22.00ppm and 0.31ppm respectively. The ethanolic, n-hexane and aqueous extracts of seeds and leaves of *Telfairia occidentalis* in the microbial screening were found to inhibit these three test micro-organisms. They are: *Pseudomonas aeruginosa*, *Salmonella typhi*, *Escherichia coli*. The two solvent extracts- ethanolic and n-hexane could not inhibit the growth of these three test micro-organisms; *Aspergillus flavus*, *Aspergillus niger* and *Candida albican*. The aqueous extracts of seeds and leaves of *Telfairia occidentalis* did inhibit the growth of *Candida albican* at 0.4mg/ml and 0.5mg/ml concentrations.

Keywords *Telfairia occidentalis*, Phytochemical screening, Microorganisms and Nutritive elements

Introduction

Telfairia occidentalis, known as fruited pumpkin is a tropical vine plant found in tropical rain forest of West Africa. It is an important vegetable grown in Nigeria. Stems of the plants have branching, long twisting tendrils and the leaves are divided into three to five leaflets with the terminal leaflets up to 15cm long. The vegetable is grown principally for leaves and seeds, which are important soup condiments. Recent studies have shown that the leaf is rich in minerals as identified in the report with some antioxidants and vitamins. The mature of the fluted pumpkin takes about 120-150 days [1-11]. The leaves contain essential oils and vitamins while the root contains lactones, cucurbitacine, sesquiterpene [12]. The fresh leaves are sliced, mixed with coconut water, salted and stored in a bottle for the treatment of convulsion as an ethno medicine [13]. The roots are used as rodenticide as an ordeal poison [14]. The essential amino-acids contents compared favorably with those of important legumes [15]. They are sometimes used as soup thickener [16].

The seed is rich in unsaturated oil that forms 61% of the oil content [2, 17] According to those the seed contain 29% and 30% protein. Aisegbu [15] reported that fluted pumpkin seed contain 47% oil and 31% protein. Oyolu [18] observed that vegetables will continue to remain the primary source of proteins, minerals and vitamins in African countries. The report of Christain [19] shows that the seed contained essential nutrients in significant amount. This portrays the fact that it can be used as an edible oil for cooking or manufacturing the margarine [19]. The symptoms

of protein energy malnutrition such as kwashiorkor and marasmus were rarely observed among dwellers in region where adequate amount of protein is obtained from fruit/seeds and leaves of plants rich on proteins such as *T. occidentalis* [11, 20].

Telfairia occidentalis being a plant must contain some phytochemicals of interest and could also be medicinal or toxic in nature. Medicinal plant is defined by WHO [21] as herbal preparation produced by subjecting plant materials to extraction, fractionation, purification, concentration of other physical or biological processes which may be produced for immediate consumption or as a basis for herbal products. Medicinal plants contain biological active chemical substances such as saponins, tannins, flavonoids, alkaloids and other chemical compounds [22-23] which have curative remedies. Thus in this work, the authors aim at the following:

- Finding the qualitative and quantitative phytochemicals present in both the seeds and leaves of *T. occidentalis*.
- Finding if the solvent extracts from the seeds and leaves of *T. occidentalis* can inhibit the growth of some pathogenic microorganisms.
- Determining the nutritive elemental contents of seeds and leaves of *T. occidentalis*.

Experimental

Sample Collection and Preparation

The seeds and leaves of *Telfaira occidentalis* were bought in AforNnobi market in Idemmili LGA area of Anambra State, Nigeria. They were dried under air and mild sun-shine, for about three weeks and ground into powder. The ground samples were then kept in a clean polyethylene bottle until needed for analysis. Qualitative and Quantitative analysis of the active Phytochemicals and the extraction of the active components are determined by the methods outlined by Harbon [22]. The anti-microbial activity of the seeds and leaves of *T. occidentalis* were determined by agar well diffusion method [24] The zone of inhibition was recorded to the nearest size in mm [25]. After extraction of the active components using three different solvents separately (Ethanol, Water and N-hexane), the solvent extracts were evaporated to dryness at about 67, 98 and 66°C respectively in a water bath separately. 1, 2, 3, 4 and 5mg of dry ethanolic, n-hexane and water extracts were weighed into five different labeled test tubes differently. Then 10ml of the corresponding solvents used for extraction was added to the dried extracts to make 0.1,0.2,0.3,0.4 and 0.5mg/ml concentrations of the extracts. Nutritive elemental content of seed and leaves *T. occidentalis* were determined using these methods: Flame photometric, colourimetric and titrimetric methods.

Results

The results of the analysis carried out on seeds and leaves of *T. occidentalis* are presented in tables 1,2,3 and figures 1,2,3a and 3b.

Table 1: Qualitative and quantitative phytochemical screening of seeds and leaves of *T. occidentalis*

Phytochemicals	Qualitative		Quantitative %	
	Seed	Leaf	Seed	Leaf
Alkaloids	+	+	1.2	1.5
Flavonoids	+	+	9.0	10.0
Tannins	+	+	6.0	3.4
Saponins	+	+	7.5	7.7
Terpenoids	+	+	8.0	2.6
Steroids	+	+	6.2	8.2
Cardiac glucosides	+	+	0.8	0.0

Key: + = indicates positive result
 - = indicates negative result
 % = indicate percentage



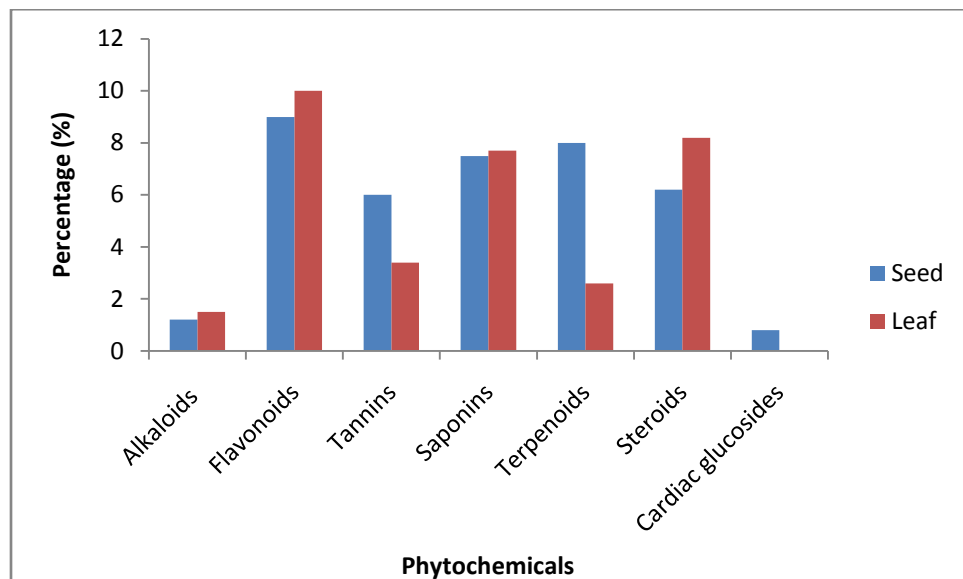


Figure 1: Bar chart showing the quantitative phytochemicals present in the seeds and leaves of *T. occidentalis*

Table 2: Nutritive elemental constituents in the seeds and leaves of *T. occidentalis*

Nutritive elements tested	Quantity present (ppm)	
	Seed	Leaf
Potassium (K)	8.54	23.76
Iron (Fe)	35.00	7.22
Sodium (Na)	66.00	7.22
Calcium (Ca)	29.70	12.62
Magnesium (Mg)	48.90	17.13
Zinc (Zn)	22.00	0.31

Key: ppm means parts per million

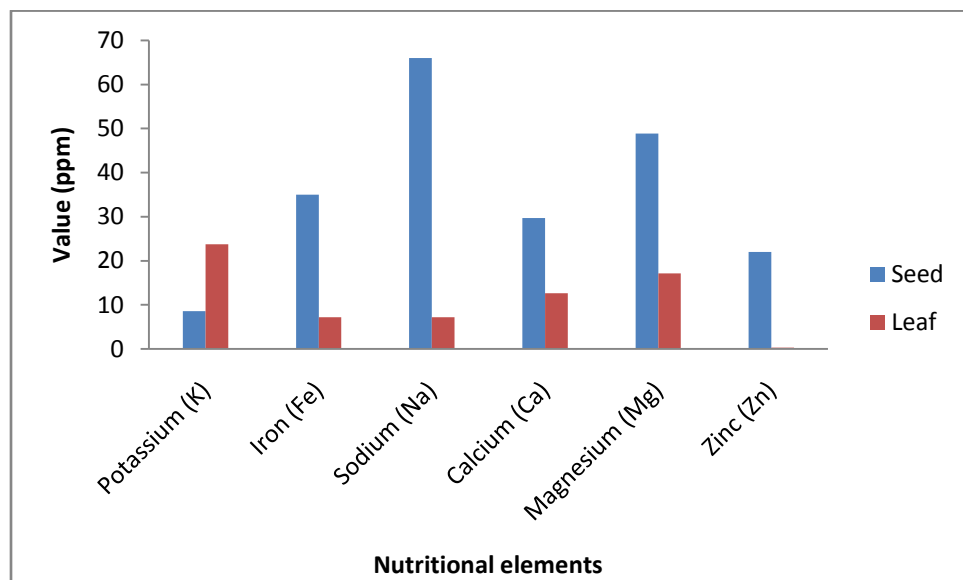


Figure 2: Bar chart portraying the quantitative Nutritive elemental constituents in the seeds and leaves of *T. occidentalis*Table 3: Antimicrobial analysis of seeds and leaves of *T. occidentalis*

Microorganism	Conc. used mg/ml	Et OH extract		N. hexane extract		Aqueous extract		+ve control		-ve control	
		Seed	Leaf	Seed	Leaf	Seed	Leaf	Seed	Leaf	Seed	Leaf
<i>P. aeruginosa</i>	0.1	NA	NA	NA	NA	NA	0.9±0.3			NA	NA
	0.2	NA	NA	NA	NA	NA	2.4±0.1	23.0±0.25			
	0.3	1.8±0.3	1.8±0.1	NA	NA	NA	5.1±0.02		24±0.6		
	0.4	3.2±0.1	3.6±0.23	NA	NA	0.12±0.2	3.4±0.1				
	0.5	6.0±0.04	7.2±0.6	0.8±0.18	2.3±0.2	2.0±0.6	24.0±0.6				
<i>S. typhi</i>	0.1	NA	NA	NA	NA	NA	NA			NA	NA
	0.2	NA	NA	NA	NA	NA	NA				
	0.3	1.2±0.3	NA	1.0±0.1	NA	NA	NA		28±0.33		
	0.4	2.6±0.1	0.8±0.1	2.2±0.3	NA	NA	1.2±0.1	20.0			
	0.5	0.1±0.5	2.1±0.3	5.2±0.5	NA	NA	2.8±0.33				
<i>E. coli</i>	0.1	NA	NA	NA	NA	NA	NA			NA	NA
	0.2	NA	NA	NA	NA	NA	NA				
	0.3	NA	NA	1.2±0.05	2.0±0.2	0.6±0.4	1.0±0.23	32.0±0.7		32.62±0.3	
	0.4	0.8±0.2	1.6±0.6	3.1±0.3	5.7±0.4	1.7±0.01	3.2±0.01				
	0.5	2.3±0.35	3.7±0.2	5.1±0.25	7.5±0.3	3.0±0.05	0.8±0.4				
<i>A. flavus</i>	0.1	NA	NA	NA	NA	NA	NA			NA	NA
	0.2	NA	NA	NA	NA	NA	NA				
	0.3	NA	NA	NA	NA	NA	NA				
	0.4	NA	NA	NA	NA	NA	NA				
	0.5	NA	NA	NA	NA	NA	NA	26.0±0.25		13.120.4	
<i>A. niger</i>	0.1	NA	NA	NA	NA	NA	NA			NA	NA
	0.2	NA	NA	NA	NA	NA	NA				
	0.3	NA	NA	NA	NA	NA	NA				
	0.4	NA	NA	NA	NA	NA	NA				
	0.5	NA	NA	NA	NA	NA	NA				
<i>C. albican</i>	0.1	NA	NA	NA	NA	NA	NA			NA	NA
	0.2	NA	NA	NA	NA	NA	NA				
	0.3	NA	NA	NA	NA	NA	NA				
	0.4	NA	NA	NA	NA	NA	1.2±0.1	28±0.2		26.4±0.31	
	0.5	NA	NA	NA	NA	NA	2.6±0.03				

Key: mm means millimeters; NA means No Action; +ve control means positive control; -ve control means negative control; mg/ml means milligram per milliliter

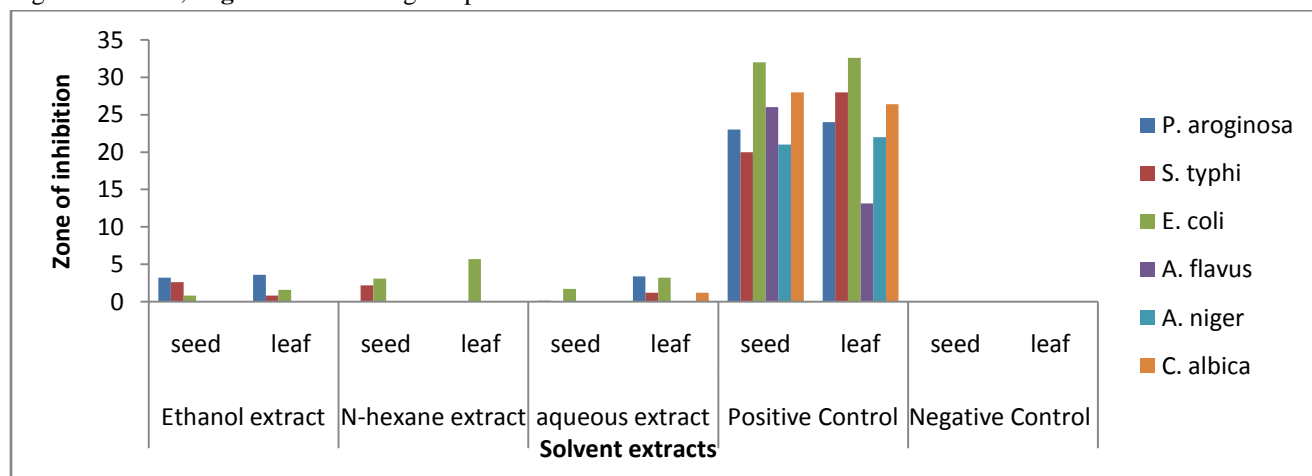


Figure 3a: Bar chart showing the zones of inhibition of three solvent extracts of seed and leaf of *T. occidentalis* at 0.4mg/ml concentration

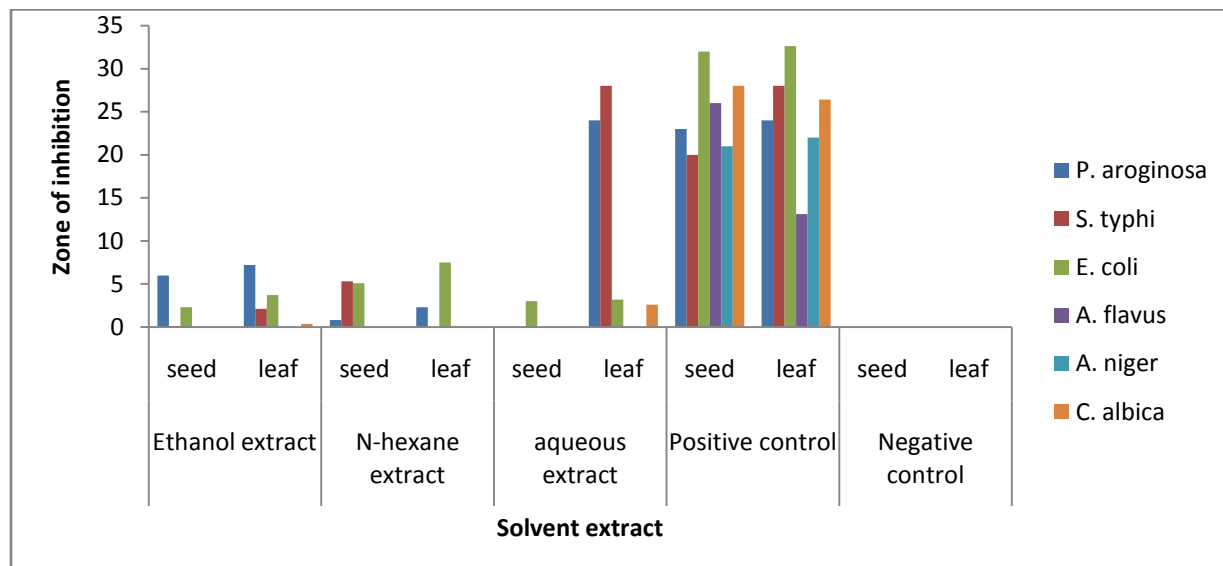


Figure 3b: Bar chart portraying the zones of inhibition of three solvent extracts of seed and leaf of *T. occidentalis* at 0.5mg/ml concentration

Discussion

Table 1 and Figure 1 portrayed the result of qualitative and quantitative phytochemical screening of seeds and leaves of *T. occidentalis*. The phytochemicals of interest identified in the seeds of *T. occidentalis* were also found to be present in the leaves. Quantitatively, the phytochemicals present in the seeds are quite comparable to that found in the leaves because none of the metabolites found in the seeds is greater than its type found in the leaves with up to 3%. The exception is seen in quantity of terpenoids contained in the seeds and leaves of *T. occidentalis* where the percentage difference is up to 5%.

Table 2 and Figure 2 showed that the quantity of the nutritive elements present in the seeds of *T. occidentalis* is very much greater than the ones found in the leaves. The table also indicated that the quantity of potassium found in the leaves *T. occidentalis* is very much greater than the one found in the seeds. It is not surprising to say that though the seeds and leaves of *T. occidentalis* are good sources of nutritive elements, the seed is a better source.

The antimicrobial activities of three solvent extracts of seeds and leaves of *T. occidentalis* on six pathogenic micro-organisms were investigated in the research. The micro-organisms are: *P. aeruginosa*, *S. typhi*, *E. coli*, *A. flavus*, *A. niger* and *C. albican*.

Tables 3, Figures 3a and 3b showed that the ethanolic extract of the seeds and leaves of *T. occidentalis* exhibited no action on *P. aeruginosa* at 0.1 – 0.2mg/ml but it exhibited some inhibitory effect on the pathogen at 0.3 – 0.5mg/ml concentrations. N-hexane extract of the seeds and leaves of *T. occidentalis* portrayed some inhibitory action on *P. aeruginosa* only at 0.5mg/ml concentration. Aqueous leaf extract of *T. occidentalis* indicated the highest zone of inhibition on *P. aeruginosa* at 0.5mg/ml concentration. N-hexane seed extract of *T. occidentalis* is the most effective on *S. typhi* at 0.5mg/ml concentration while the leaf extract has no action on it at 0.1 – 0.5mg/ml concentrations. N-hexane leaf extract is the most effective on *E. coli* at 0.5mg/ml concentration. At 0.1 – 0.5mg/ml, all the three solvent extracts had no effect on these two test micro-organisms: *A. flavus* and *A. niger*. All the solvent extracts again had no effect on *C. albican* at all concentrations with the exception of the aqueous leaf extract of *T. occidentalis* which showed some inhibitory effect on it at 0.4 – 0.5mg/ml.



Conclusion

The analytical investigation showed that, the crude extracts of seeds and leaves of *T. occidentalis* had anti microbial effect on these four organisms which are; *P. aeruginosa*, *S. typhi*, *E. coli* and *C. albican*.

This implied that crude solvent extracts of seeds and leaves of *T. occidentalis* could be used to cure diseases caused by the above mentioned four micro organisms. The result of this investigation also portrayed the fact that, traditional medicinal use of seeds and leaves of *T. occidentalis* should continue and bioactive ingredients responsible for the antimicrobial properties of seeds and leaves of *T. occidentalis* should be elucidated.

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