

***FICUS INGENS* (MIQ.) MIQ. (MORACEAE): PHYTOCHEMICAL AND PROXIMATE COMPOSITION**

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ABSTRACT

Ficus ingens commonly called fig is a plant of high medicinal values possessing many of the biological activities like antibiotic and analgesic. The medicinal potentials of this plant lies in its phytochemical constituents. Hence the present study was carried to evaluate and compare the phytochemical and proximate composition of the bark, leaf and root of this plant. The results of the phytochemical screening revealed the presence of tannins, saponins, phenols, flavonoids and glycosides. Aside glycosides, the leaf and root showed significantly higher quantity of aforementioned phytochemicals than those recorded from the bark. Tannins had the highest mean values of 12.30 ± 0.11 mg/100 g followed by phenols (3.67 ± 0.03 mg/100 g), glycosides (3.60 ± 0.08 mg/100 g), flavonoids (2.69 ± 0.02 mg/100 g) and saponins (0.64 ± 0.02 mg/100 g). Results of the proximate composition showed the root had significantly higher amount of ash, crude protein, crude fat and carbohydrate with lowest moisture when compared to the other plant part. Fibre was highest in leaf followed by root and bark. Generally, the plant a good source of fibre and poor source of fat as indicated by mean values of $37.26 \pm 0.04\%$ and $2.19 \pm 0.02\%$ respectively. The present investigation revealed that the leaf and root of *Ficus ingens* contained bioactive substances that are attest to their usefulness in the treatment of several ailments. The parts could also find their usefulness in drug making.

KEY WORDS: tannins, saponins, phenols, flavonoids, glycosides, crude fibre, crude fat, *Ficus ingens*.

INTRODUCTION

Ficus ingens (Miquel) Miquel belongs to the Moraceae family (Burrows & Burrows, 2003). It grows throughout the tropics with a few species extending into the semi-warm temperate zone (Adebayo-Tayo & Odeniyi, 2012; van Noort & Rasplus, 2017). The plant is an evergreen deciduous tree up to 10 m in height, with a rounded or spreading crown and a spread of up to 30 m wide (Donia & Basodan, 2013). It is one of the numerous medicinal plants with long historical use in traditional herbal practices in the treatment of anaemia, piles and diarrhea. The bark is considered a tonic. Extracts of the bark are administered to cows with a low milk production. Zulus in South Africa also give the same to people suffering from anaemia. In Borno State, Nigeria, preparations of the bark, roots and leaves are used for piles and diarrhea

and as laxative and diuretic (Myburgh *et al.*, 1994). A maceration of the leaves is used as treatment against malaria (Achigan-Dako, *et al.*, 2010). The latex is used as a substitute disinfectant for iodine and has also found usage in the area of wound healing (Von Maydell, 1990). The leaves of *Ficus ingens* are known to be toxic and nervous disorders have been reported where cattle have eaten the leaves during dry spells (Myburgh *et al.*, 1994). Extracts from *Ficus* leaves showed anti-inflammatory, analgesic, hypotensive, laxative and anti-rheumatic activities (Khedr *et al.*, 2015; Bercu, 2015). Extracts of *Ficus* spp. including *ingens* have been reported in the treatment of diarrhea, dysentery, sexually transmitted disease-causing microorganisms, chest ailments, tuberculosis, leprosy, convulsions, pain, anaemia and wound (Sandabe & Kwari, 2000; Amos *et al.*, 2001; Wakeel *et al.*, 2004; Ahmadu *et al.*, 2007; Oyeleke *et al.*, 2008).

Several studies have been reported on the medicinal values of the plant with little or no consideration on the bioactive substances that are responsible for its healing properties. Hence, the presents study was carried out to provide information on phytochemical constituents and proximate composition of the bark, leaf and root that are frequently utilised in the treatments of several diseases.

MATERIALS AND METHODS

Collection and preparation of plant samples. Fresh barks, leaves and roots of matured plant of *Ficus ingens* were collected from population within Ekiti in Kwara State, Nigeria. The collected samples were kept in paper envelopes and transported to the Plant Biology Laboratory of University where the samples were cleaned with sterile distilled water and air dried for 5 days.

Extraction procedure. The dried plant parts were ground into fine powder using an Electronic grinding machine. The powdery form of each plant parts was sieved using 2.00 mm wire mash. The powdered samples were then subjected to both qualitative and quantitative phytochemical screening.

Qualitative phytochemical examination. The aqueous extracts of barks, leaves and roots were subjected to qualitative phytochemicals to test for the presence of secondary metabolites following the procedure of Sofowora (1993).

Quantitative phytochemical examination. Quantitative phytochemical examination carried out on the aqueous extracts of barks, leaves and roots of *Ficus ingens* were done using the procedures of Onwuka (2005).

Proximate Composition. The proximate composition of the plant parts such as moisture, protein, crude fat, ash, fibre and crude protein were determined following the methods of Association of Official Analytical Chemists (AOAC 2003).

Data analysis. Data were analyzed using One-Way Analysis of Variance under Statistical Package for Social Sciences (SPSS) software version 17. Means recorded from various plant parts were separated using Duncan Multiple Range Test (DMRT) at 5% level of probability.

RESULTS AND DISCUSSIONS

Result of qualitative analysis revealed the presence of tannins, saponins, flavonoids, phenols, glycosides in the all the plant parts investigated (Table 1). Compounds such as

phlobatannins and resins were respectively absent in leaf and bark. Alkaloids and steroids were absent in all the plant parts (Table 1). Some of these phytochemicals most importantly saponins, flavonoids, and tannins have been found to be of high medicinal values (Tsuchiya *et al.*, 1996; Singhal, 2001; Oloyede, 2005; Doughari, 2012). The absence of those aforementioned phytochemical compounds may be attributed to the solvent used in this study.

TABLE 1. Qualitative phytochemical screening of powdered extracts of *Ficus ingens* plant parts

Chemical constituents	Plant parts		
	Bark	Leaf	Root
Tannins	+	+	+
Saponins	+	+	+
Flavonoids	+	+	+
Phenols	+	+	+
Alkaloids	-	-	-
Glycosides	+	+	+
Steroids	-	-	-
Phlobatannins	+	-	+
Resins	-	+	+

Key: + Present
- Absent

TABLE 2. Quantitative phytochemical screening of *Ficus ingens* plant parts

Constituents (mg/100 g)	Plant parts			Mean	p-value
	Bark	Leaf	Root		
Saponins	0.28 ± 0.01 ^c	1.24 ± 0.02 ^a	0.42 ± 0.03 ^b	0.64 ± 0.02	<0.001
Flavonoids	0.84 ± 0.02 ^c	5.82 ± 0.03 ^a	1.40 ± 0.02 ^b	2.69 ± 0.02	<0.001
Glycosides	5.81 ± 0.21 ^a	1.89 ± 0.02 ^c	3.11 ± 0.02 ^b	3.60 ± 0.08	<0.001
Tannins	4.74 ± 0.06 ^b	27.30 ± 0.24 ^a	4.86 ± 0.04 ^b	12.30 ± 0.11	<0.001
Phenols	1.07 ± 0.00 ^c	8.15 ± 0.02 ^a	1.80 ± 0.07 ^b	3.67 ± 0.03	<0.001

Values followed by same superscript(s) along the row are statistically the same at $p \leq 0.05$.

Values are presented as mean ± SEM (SEM is the standard error of mean).

n = 3 plant parts used (leaf, bark and root)

TABLE 3. Proximate composition of *Ficus ingens* plant parts

Proximate Composition (%)	Plant parts			Mean	p-value
	Bark	Leaf	Root		
Moisture	52.15 ± 0.35 ^a	34.67 ± 0.11 ^b	6.65 ± 0.06 ^c	31.1 ± 0.17	0.001
Total ash	3.53 ± 0.03 ^c	5.62 ± 0.18 ^b	9.76 ± 0.14 ^a	6.30 ± 0.08	0.001
Crude protein	6.11 ± 0.15 ^b	2.80 ± 0.13 ^c	14.52 ± 0.15 ^a	7.81 ± 0.14	0.001
Crude fibre	25.67 ± 0.04 ^c	48.75 ± 0.05 ^a	37.36 ± 0.02 ^b	37.26 ± 0.04	0.001
Crude fat	1.73 ± 0.01 ^a	1.68 ± 0.03 ^b	3.17 ± 0.01 ^a	2.19 ± 0.02	0.001
Carbohydrate	10.83 ± 0.27 ^b	6.50 ± 0.39 ^c	28.55 ± 0.06 ^a	15.29 ± 0.24	0.001
Energy value (Kcal)	83.32 ± 1.57 ^b	52.28 ± 0.80 ^c	200.80 ± 0.73 ^a	112.13 ± 1.03	0.001

Values followed by same superscript(s) along the row are statistically the same at $p \leq 0.05$.

Values are presented as mean ± SEM (SEM is the standard error of mean).

n = 3, plant parts used (leaf, bark and root)

The phytochemicals as shown in Table 2 differed significantly ($p \leq 0.05$) in all the plant parts. Regardless of the plant parts, tannins showed the highest mean values of 12.30 ± 0.11 mg/100 followed by phenols (3.67 ± 0.03 mg/100 g) glycosides (3.60 ± 0.08 mg/100 g), flavonoids (2.69 ± 0.02 mg/100 g) and saponins (0.64 ± 0.02 mg /100 g) (Table 2). Among the

plant parts, significantly greater amount of all the aforementioned phytochemicals were recorded from the leaves except glycosides. This was closely followed by the root (Table 2). They recorded the significantly lowest amount of all the phytochemicals except glycosides when compared to leaf and root (Table 2).

The foregoing results had shown that the phytochemicals occurred in varying amounts. The higher amount of tannins most importantly in the leaves attest to the use of this plant in the treatments of intestinal disorders such as diarrhea and dysentery (Dharmananda, 2003). Tannins are also used in wound healing (Kar, 2007) as astringents and antimicrobial (Singal, 2001). Phenols which is next to tannins have been found to play an important role in plant defense against pathogens herbivore and predators. They are also applicable in the control of human pathogenic infections (Ianovici *et al.*, 2009; Doughari, 2012). This study had shown that the bark of *Ficus ingens* is a good source of glycosides. Glycosides have been known to help in the improvement of cardiac conditions by reducing blood pressure, increasing circulation and inhibiting the accumulation of arteriosclerosis plaque and blood clots (Liu, 2004; Ayoola *et al.*, 2008). Similarly, glycosides have been found to abate the decay of damage plant tissue, they are an important class of naturally occurring drugs whose actions help in the treatment of congestive health failure (Ikeda *et al.*, 1995; Ianovici *et al.*, 2010). Flavonoids are used as antioxidants or free radicals scavengers as well as quenchers of singlet oxygen formation (Kar, 2007; Ali & Neda, 2011). Flavonoids also exhibit a wide range of biological activities which include antimicrobial, anti-inflammatory, anti-angionic, analgesic, anti-allergic effects, cystostatic and antioxidants properties (Maikai *et al.*, 2009). As demonstrated in this study, saponins were least in amount in all the plants parts investigated. This may imply that the plant may not be a good source of this substance that has been considered a key ingredient in traditional medicine in China (Liu & Henkel, 2002). According to Just *et al.* (2002) the compounds are also known to produce inhibitory effects on inflammation. Sarker *et al.* (2007) have reported hypolipidemic and anticancer activity of saponins.

Table 3 shows the results of proximate composition of the aqueous extracts of bark, leaf and root of *F. ingens*. The proximate composition varied significantly ($p \leq 0.05$) among the plant parts. Regardless of the parts, crude fibre had the highest percentage mean value of $37.26 \pm 0.04\%$ followed by moisture ($31.1 \pm 0.17\%$), carbohydrate ($15.29 \pm 0.24\%$), crude protein ($7.81 \pm 0.14\%$), ash ($6.30 \pm 0.08\%$) and crude fat ($2.19 \pm 0.02\%$) (Table 3). The plant is a rich source of fibre and is highly concentrated in leaf and root. Fibre helps to slow down the rate of glucose absorption into blood stream and thereby reducing the risk of hyperglycemia (Okeke & Adaku, 2009). In animal production dietary fibre contributed to the palatability and supplementation of feeds (Mensah *et al.*, 2008). Moisture which is next abundant to fibre was very low in root compared to bark and leaf. The low moisture value of the root is an indication of longer shelf life. According to Olutiola *et al.* (1991) and Uriah & Izuagbe (1990), moisture contents of plant materials are index of water activity and are used as measure of stability and the susceptibility to microbial contamination. As a universal solvent it helps in dissolving other substances, carries nutrients and other materials round the body, making it possible for organs in the body to perform their respective function optimally (Okeke & Adaku, 2009). In this study, the root recorded significantly higher amount of carbohydrate than other plant parts. Carbohydrate are major source of energy for man and animal (Okeke, *et al.*, 2008). Protein was found to be significantly higher in root compared to leaf and bark. Proteins boost the immune

system and play a role in cell division as well as growth (Okeke & Elekwa, 2006; Okeke *et al.*, 2008). The ash content was concentrated in leaf and root. This implies that the leaf and root are rich sources of mineral elements. They can therefore be used as agent of remediating the organic and inorganic contaminant (Singh *et al.*, 2009; Tahan, 2011). *F. ingens* is a very poor source of crude fat. Fats are necessary for hormone production, insulation and protection of vital organs (Dutta, 1981). The significantly higher energy values of the root when compared to other part could be attributed to higher protein, fat and carbohydrate contents of this part.

CONCLUSION

The foregoing discussion has shown that variation exists in the concentration of both phytochemical and proximate analysis of *F. ingens* bark, leaf and root. Furthermore, most of these constituents were found in abundant in the leaves and root but lowest in the bark. The presence of these phytochemicals and nutrients attest to the usefulness of this plant in the treatment of several diseases. Also the leaf and root could serve as ingredients in pharmaceutical industries.

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