International Journal of
Medicinal Chemistry & Analysis
www.ijmca.com
e ISSN 2249 - 7587
Print ISSN 2249 - 7595

PROXIMATE, ELEMENTAL CONTENT AND PRELIMINARY PHYTOCHEMICAL SCREENING OF *PSIDUM GUAJAVA* LINN STEM BARK

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ABSTRACT

The plant *Psidium guajava* has been subjected to proximate and elemental determination. Also preliminary phytochemical screening was carried us to ascertain the secondary metabolites such as flavonoid, carbohydrate, saponins, tannins, cardio glycoside and terpenoids present in the ethanolic extract of the plant. The proximate analysis show the percentage content of dry matter (97.1%), moisture (2.9%), crude protein (0.70%) fat, (1.0%) crude fibre, (22.0%) Ash (3.0%), carbohydrate, (73.3%). The elemental content was determined by Atomic absorption spectroscopy (AAS) reveal the presence of some element such as potassium (6.40mg/l), manganese (0.11mg/l), iron (0.23mg/l), zinc (0.70mg/l), phosphorus (4.70mg/l), cadmium (0.25mg/l), chromium (0.14mg/l). Lead and sodium are not detected. Content The stem bark of *Psidium guajava* has phytochemicals such flavonoid, carbohydrate, saponins, tannins, cardio glycoside, terpenoids. The presence in the carbohydrate, protein, fats and the mineral element indicate the nutritional benefit of the plant while the phytochemical found are implicated in having a lot of medicinal important.

Keywords: *Psidium guajava*, Tannins, Terpenoid.

INTRODUCTION

Increased awareness of the significance of medicinal plant and nutrition to the health individuals and communities has necessitated the need for knowledge of the of food nutrients and phytochemicals present in various part of different plant. The phytochemical contained in the plants are largely responsible for the definite physiological activity they exert on human body [1]. *Psidium guajava* has numerous name by which it identified at different places across the globe. The guava or Psidium is a global plant and belongs to the myrtle family (Scientific name myrtaceac) and the fruit is recognized by its common English name or its equivalent in other languages across the world. French call the fruit goyava or goyavier while spanish named the tree guyava [2].

EXPERIMENTATION

Sample collection and Identification

Fresh sample of *Psidium guajava* were collected at university of Maiduguri, Borno state Nigeria near gate one. The plant specimen was identified by a plant taxonomist, Prof. S. S. Sanusi, Department of Biological Science, while the voucher specimen 444b was deposited at the Post-Graduate Research Laboratory, Department of

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Chemistry University of Maiduguri. The stem bark was air-dried in the laboratory. Five hundred gram (500g) of it was pulverized into a coarse powder using mortar and pestle.

Determination of Proximate Composition

The grounded air-dried seed (10.0g) of *Psidium guajava* was exhaustively processed for various parameters according to the Association of Official Analytical Chemists method [3].The proximate analysis (carbohydrates, fats, crude protein, moisture, dry matter, crude fiber, nitrogen free extract and ash) of the leaves were determined using AOAC methods. Using weight difference, moisture and ash were obtained. The fiber content was estimated from the loss in weight of crucible and its content on ignition. Carbohydrate was determined when the sum of the percentage of moisture, ash, crude protein and fats were subtracted from 100. The nitrogen value, which is the precursor for protein of a substance, was determined by micro kjeldahi method, involving digestion, distillation and finally titration of the sample[8]. The nitrogen value was converted to protein by multiplying with a factor of 6.25. The determination of crude lipids content of the samples was done using soxhlet type of direct solvent extraction method. The solvent used was petroleum ether (boiling range 40 -60^{0}c). While the nitrogen free extract was calculated indirectly by difference as the sum of crude protein, fibre, fats and ash subtracted from 100. The result of proximate value was all estimated as percentage [4].

Extraction and phytochemical analysis

One Hundred (150g) of the powdered dried stem bark was soxhlet extracted using the following 90% ethanol. The crude extract obtained was concentrated to dryness in a vacuum using a rotary evaporator between 40^{o}C to 45^{o}C. The extracts were weighed, labeled and subjected to further work. The extract was subjected to preliminary phytochemical screening by adopting the standard protocols described by [5, 6] and [1].

Determination elemental content of the stem bark of *Psidium guajava*

Ashing and Digestion

The pulverized air dried stem of five grams (5g) of the was packed into an acid washed porcelain crucible and ashed in a muffle furnace for 3 hours at 550^{O}C. The crucible was removed from the furnace and cooled. To the ashed sample (0.5g), 10 ml of 6M HCl was added and covered, and this content was then heated on a steam bath for 15minutes. Then 1 ml HNO_3 was then added and the mixture was heated for an hour in order to dehydrate silica and completely digest organic substances. Lastly 5 ml of 6M HCl and 10 ml distilled water were added and the mixture was heated on a steam bath to complete dissolution. The mixture was then cooled and filtered through Whatman No. 1 filter paper into a 100ml volumetric flask and then made up to the mark with distilled water (AOAC, 1990., Abdulrahman *et al*., 2012). Elemental contents were determined using AA-6800 Shimadzu Japan atomic absorption spectroscopy (AAS) and DR/2000 direct reading spectrophotometer. The laboratory procedure for the preparation and determination of micro and macro elements was used as outlined by [7] for plant sample.

RESULT AND DISCUSSION

The proximate analysis of the stem bark shows the percentage of the following crude protein (0.70%) crude fibre, (22.0%) moisture content, (2.9%) EE or fat, (1.0%) dry matter (97.1%), Ash (3.0%), carbohydrate (73.3%). The presence of elements in the stem bark of *psidium guajava* (Guava) is shown in Table 1. The results reveals that sodium (Na) not detected while and contain of potassium (K) is found at a concentration of 6.40mg/l. Manganese (Mn) concentration is found at 0.11mg/l while iron being an essential trace element has been found to be 0.23mg/l . Iron relevance in hemoglobin formation and normal functioning of the central nervous system and also carbohydrate oxidation cannot be over emphasized . Zinc is an essential element in the nutrition of man where it functions as an integral part of numerous enzymes or as a stabilizer of molecular structure of sub-cellular constituent and membrane. [8]. Also zinc participates in the synthesis and degradation of carbohydrate lipid protein and nucleic acid and this in the process of genetic expression[8]. The zinc content concentration in *psidium guajava* stem bark is found to b 0.70mg/l. Cadmium (Cd) concentration is 0.25mg/l in stem bark of *psidium guajava* and Lead (Pb) is not detected in the the stem bark.

Preliminary phytochemical screening analysis as shown in Table 2. below reveals the presence of the following carbohydrate, tannis, cardiac glycoside test for flavonoid, Terpenoid, Saponins, Anthraquinone, Alkaloid is absent in the extract. The role of this phytochemical in treatment of diseases cannot be over emphasized. Flavonoid benefit includes antioxidant, stress modifier, antiallergic, antibacterial, antifungal anti-inflammatory, antipyretic and anticarcinogenic [1, 9].

Table 1. Proximate content of *Psidium guajava* (Guava) stem bark

Sample	% dry mater	% moisture content	% crude protein	%EE of fat	% crucible fibre	% Ash	% carbohydrate
Stem bark	97.1	2.9	0.70	1.0	22.0	3.0	73.3

Table 2. Preliminary phytochemical screenings of ethanolic extract of Psidium guajava (guava) stem bark

Test	Inference
Carbohydrate	+
Tannis	+
Soluble starch	-
Cardiac glycoside	+
Flavonoids	+
Terpenoid	+
Saponins	+
Anthraquinone	-
Alkaloid	-

Key; - = absent + = present

Table 3. Elemental compositions of Psidium guajava (Guava) stem bark

Minerals	Concentration (mg/l)	WHO (1996). Concentration mg/l
Sodium Na	ND	4-5
Potassium (k)	6.40	0.1-1
Manganese (Mn)	0.11	1000-2000
Iron (Fe)	0.23	0.5-50
Zinc (Zn)	0.70	15-20
Phosphorus (P)	4.70	0.05-3
Cadmium (Cd)	0.25	10-35
Lead (Pb)	ND	1-3
Chromium	ND	

Key; ND= Not detected.

CONCLUSION

Guava plant is widely used as source of nutrition and in some cases in traditional medicine. The proximate analysis of the stem bark shows the percentage of the following crude protein (0.70%) crude fibre, (22.0%) moisture content, and (2.9%) EE or fat, (1.0%) dry matter (97.1%), Ash (3.0%), carbohydrate (73.3%). The elemental analysis conducted by Atomic absorption spectroscopy. (AAS) reveal the mineral composition of the stem bark, potassium (4.70mg/l), magnesium (0.11mg/l), Iron (0.23mg/l), zinc (0.70mg/l) , Phosphorus (4.70mg/l), cadmium (0.25mg/l), while Chromium, Lead and sodium are not detected. The concentration of the element are below the World health organization (WHO, 1996) safety limit. The phytochemical screening conducted revealed the presence of active phytochemical which include carbohydrate, tannin, flavonoids, terpenion, saponins, cardiac glycoside while anthraquinone and alkaloid Guava tree has a lot of medicinal important due to its phytochemical content. This research has enumerated the medicinal importance of *Carica papaya* (paw paw) by it contents of flavonoid, alkaloid and tannins and its nutritional relevance is indicated with the mineral elements and proximate compositions.

ACKNOWLEDGMENT

The authors wish to acknowledge Messers Fine Akawo and Shehu Jauro of Department of Chemistry, Faculty of science, and Animal Science, faculty of Agriculture University of Maiduguri. Also thanks goes to the University of Maiduguri for providing necessary laboratory facilities for the research.

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