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PHYTOCHEMICALS, PROXIMATE AND MINERAL CONTENT SCREENING OF CARICA PAPAYA, RIPE AND UNRIPE SEEDS

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ABSTRACT

The seeds of paw-paw (Carica papaya) are usually thrown away during preparation of paw-paw fruit. Apart from being edible fruit, the Carica papaya have served at various levels in the management of some human ailments. Different parts of the plant are used to treat several diseases such as malaria, diabetes, ulcer and skin diseases. This study is aimed at investigating the phytochemicals, proximate and mineral content of ripe and unripe seeds of Carica papaya. Extracts from the seeds obtained from 9th mile corner, Udi L G A. Enugu were evaluated using standard methods. Phytochemical screening of the extracts of the seeds showed that unripe seeds of Carica papaya have higher percentage composition of glycosides (0.116%) then the ripe seeds (0.00561%). Alkaloid ontent for ripe seed is 0.118% and the unripe (0.00530%). Saponin content for the ripe seed is 5.355% and the unripe 9.329%. The result of the proximate analysis showed that moisture content for ripe seeds is 79.78% and that for the unripe is 81.26%, Ash content - 1.267% for ripe, 0.4112% for unripe seeds. Crude fibre content for ripe seeds is 3.69% and 0.098% for the unripe. Protein content for the ripe seeds is 0.0006% and unripe is 0.0000%. Lipid content for the ripe seed is 0.18% and unripe 0.26%. Carbohydrates content for ripe seed is 15.07% and unripe 17.08%. The results indicates that paw-paw seed contained high moisture content, low ash, low Lipid. The seeds also contained very low protein. Elemental minerals such as Ca, K, Mg, Mg, Fe and Zn were found present both in the ripe and unripe seeds.

INTRODUCTION

Papaya belongs to a small family caricaceae having four generalin the world. The genius carica papaya is represented by four species in India of which carica papaya is the most

widely cultivated and best known specie (Jean et al, 2011). It is commonly known as papaya melon tree, pawpaw or papau, kapaya lapaya,papyas, papye. Tapayas, Fanmugua, Papita, Arand -kharpuja, Papaya baun and papaya (Bhattachrjce, 2001). The taxonomical classification includes Kingdom (plantae), Order (brasscales), Family (caricaceae) Genus (carica) and Species (papaya). Papaya is an herbaceous succulent plant that possess self-supporting stems. The papaya is a native of North-America and has spread to several regions of the world and its largest producers are India, Brazil, Mexico, and Nigeria. It is well distributed in most of the tropical countries. It is generally found in tropical zones of the planet as it thrives in hot humid frost free climates Papaya plant is considered a tree, though its palm-like trunk, up to 8 meters tall, the tree is covered by deeply lobed leaves (Chan-Prove et al, 2010). The internal cavity of the fruit contain numerous black seeds, edible spicy coated with mucilaginous substance and it comprises about 15% weight of the fruit (Burla Sunitha et al, 2018).

A study conducted by the University of Florida researchers Nan Dang and colleagues in Japan has documented papaya's powerful anti-cancer properties and its impact on numerous lab-grown tumours. Papaya seeds contain fatty acids, crude fibre, crude protein, papaya oil, carpaine, caricen, gluco-tropaeolin, benzyl isothiocynate, etc. Papaya is available throughout the year and is considered a powerhouse of nutrients (Aranvid et al, 2013). All the nutrients of papaya as a whole improve cardiovascular systems, protect against heart diseases, heart attacks, strokes and prevent colon cancer (Megan,2017).

According to Aranvid et al, the fruit is an excellent source of beta carotene that prevents damage caused by free radicals that may cause some forms of cancer. Papaya helps in the digestion of protein as it is a rich source of proteolytic enzymes. Papain, a digestive enzyme found in papaya can be extracted, dried as a powder and used as an aid in digestion. The unripe fruit is used as a remedy for ulcer and impotence (Elizabeth, 1994). The fruit is used as a remedy for abdominal disorders

Ayoola and Adeyeye (2010), examined the phytochemical and nutrient content of papaya leaves, the study revealed the presence of phytochemicals in them which makes papaya leaves a potential anti malaria

agent. The study also shows that the yellow leaves are equally used as anti anaemic agent while the brown leaves can be effective as a body cleanser. Juice from papaya root is used to ease urinary troubles in some countries.

A decoction formed by boiling the outer part of the roots of the tree helps in the cure of dyspepsia. Papaya seeds are very pungent and peppery, making them most unpalatable, however the seeds seem to have more potent medicinal values than the flesh. Papaya seeds are rich in fibre. They keep our digestion on track, thus helping in the rernoval of toxins from our body .Carica papaya seeds have been confirmed in many studies for their anthelminthic properties against nematodes found in animals (Chota, 2010).

Papaya seeds possess several pharmacological activities including anthelminthic, anti-fertility, contraceptive, anti-inflammatory, analgesic and antimicrobial properties (Agarwal et al, 2016). Other pharmacological uses of the seeds include carminative, emmenagogue, abortifacient, counter irritant, and anti-fertility agent in males. Seed juice can be used to treat bleeding, piles and in large liver and spleen (Roshan et al, 2014).

Chinoy et al, 2006 proved the anti-fertility, anti-implantation and abortifacient properties of extracts from papaya ripe seeds. Papaya ripe seeds are also used to produce indigenous Nigerian food condiment called Daddawa, the house word for fermented condiment (Dakare, 2004). Athelminthic activity of papaya seeds have been attributed to the presence of capain andcarpasemine. This study is aimed at investigating the phytochemical, proximate and mineral content of ripe and unripe papaya seeds in order to explore more of its medicinal potentials.

Materials and Methods

Sample preparation

The ripe and unripe pulps of paw paw (carica papaya) were purchased from a local farm at ninth mile corner Ngwo in Enugu State. The pulps were transported to the laboratory where they were cut and seeds of ripe and unripe papaya were collected and stored in different sample tubes for preparation. Fresh seeds were blended and stored in sterilized laboratory tubes from where samples were collected for analysis.

Phytochemical Analysis

The phytochemical screening of extracts of samples was done using methods described by J B Harbone (1984).

Mineral Analysis

The analysis of selected minerals were determined using methods of AOAC (2000). Calcium, potassium, iron, zinc and magnesium were determined by atomic absorption spectrophotometric methods.

1.0g of the prepared samples were first digested with 5ml of acid mixture (40 % Hydrofluoric acid) and 5 drops of sulphuric acid were added using a plastic pipette or measuring cylinder in a platinum crucible. The fume was evaporated to dryness on a hot plate .The procedure were repeated until the sample is completely decomposed. The residues were extracted with diluents and transferred quantitatively to a 200ml volumetric flask. The solutions were diluted to a volume with diluents. Potassium, magnesium, calcium and sodium were determined by flame photometric method, while iron and zinc were determined by atomic absorption spectrophotometric method.

Proximate Analysis

This analysis involves the determination of the percentage constituents of the following parameters. Moisture content, ash content, fat content, protein content crude, fiber and carbohydrate. The moisture was determined using the procedures in AOAC (1993). protein level was determined by Kjeldahl method, according to association of analytical chemists AOAC (1995).

The ash was determined by calcinations at 600°C according to official methods and recommended practices of the American oil chemists' society AOAC (1993). The lipids were extracted using soxhlet with petroleum ether at 60°C according to AOAC(1993).Total fiber were determined according to the method of Porsley et al. Carbohydrate was determined by Difference % Carbohydrate=100 - (% Ash+ % Fibre+ % Moisture+ % Protein+ % Fat).

RESULTS

Proximate Analysis of Ripe and Unripe Pawpaw Seeds

S/N	Sample	% Moisture	% Ash	% Crude Fibre	% Protein	% Lipid	% Carbohydrate
1	Ripe seeds	79.788	1.267	3.689	0.0006	0.18	15.0754
2	Unripe seeds	81.262	0.411	0.982	0.0000	0.26	17.085

Elemental / Mineral Analysis

S/N	Parameters	Ripe (%)	Unripe (%)
1	Ca	33.62	27.78
2	K	12.89	18.55
3	Mg	44.27	37.52
4	Mn	44.26	51.33
5	Fe	29.52	14.02
6	Zn	38.31	27.09

Phytochemical Analysis of Ethanol Extract

S/n	Constituent	Experimental method	Ripe Seeds	Unripe Seeds
1	Carbohydrate			
A	Carbohydrate	Molisch's test	-+	+-
B	Polysaccharides	iodine test	-	-
C	Reducing sugar	Benedicts test Fehling's test	-+	+-
D	Reducing monosaccharides	Barfoeds test	-	-
E	Pentose sugar	Bials test		
F	Ketose sugar	Seliwanoffs test	-	+
2	Protein			
A	Protein test	Biuret test	-	+
B	Protein test	Picric acid test		
C	Amino acid	Ninhydrin test	-	-
D	Aromatic amino acid	Xantheoprotein	-	-
E	Fixed oil	Filter paper	-	+

Metabolites				
3	**Saponins**	**Frothing test**	**++**	**++**
4	**Glycosides**		**-**	**-**
5	**Alkaloids**	**Picric acid test**		
		Wagner's test	**++**	**+**
		Dragendroff test	**++**	**++**
Tannin & phenol				
A		**Ferric chloride test**	**-**	**-**
B		**10% FeCl3 test**	**-**	**++**
		1% Potassium Ferricyanide	**-**	**++**
Flavonoids				
A		**Shinoda test**	**-**	**-**
B		**Zinc–HCl reduction**	**-**	**-**
C		**Lead Acetate test**	**-**	**-**
Terpenoids				
A		**Salkowski test**	**-**	**-**
B		**Sterold**		
		a	**-**	**-**
		b	**-**	**-**
		c	**-**	**-**

+ present in trace concentration **present in moderately high concentration ++,**

+++ present in very high concentration

4.4 Quantitative Phytochemical Analysis

Table of Result for Quantitative Phytochemical Analysis (in percentage (%)

S/N	Parameters	Average concentration (%) for ripe seeds	Average concentration (%) for unripe seeds
1	Glycosides	0.116	0.056
2	Alkaloid	0.116	0.056
3	Saponin	5.355	9.329
4	Flavonoids	-	-
5	Phenol	-	0.032
6	Tannins	-	0.057

Phytochemical Analysis of Dichloromethane Extract

Parameter	Test method	Dichloromethane unripe	Dichloromethane Ripe
	Moisture	+	+
	Iodine	-	-
	Barfoeds	-	-
	Fixed oil	-	-
	Ninhydine	-	-
	Xanthoprotein	-	-
	Burret	-	-
	Silwingff	-	-
Saponin	Foam	-	-
	Glycosides	-	-
Alkaloid	Wagner's	-	-
Tannin and phenol	Ferric	-	-
	Chloride	-	-
	10% Ferric chloride		
Flavonoid	Shinoda	-	-
	Zinc	-	-
	Lead Acetate	-	-
Terpenoids steroids	Salkowski	-	-
		-	-
	A		
	B	-	-
	C	-	-
		-	-
	Zinc – HCl reduction	-	-
B			
C	Lead acctate test	-	-
Terpenoids			
A	Salkowski test	-	-
B	Sterod		
	a	-	-
	b	-	-
	c	-	-

+ presence in trace concentration ++presence in moderately high concentration

+++ presence In very high concentration

DISCUSSION OF RESULTS

The proximate composition of ripe and unripe pawpaw seed have been studied and are presented in table 2 as seen above. The moisture content of the both seed was 77.188% for ripe pawpaw and 81.262% for unripe seeds this implies that the moisture content of the both seeds are high and can reduce the shelf life of the seeds as reported by Puangrsi et al. The ash content indicates level of mineral content of the seeds. The ash also represents the presence of organic materials from where mineral contents could be obtained while the crude fiber indicates that the seeds contain a portion of cellulose, hemicellulose and lignin which help in the maintenance of human health and has been known to reduce cholesterol level in the body. High fiber foods are effective anti-constipation agents. Fiber also reduces the risks of various cancers, bowel diseases and improves general health and well-being of individual, The pawpaw unripe seeds show a high percentage of lipid and carbohydrates than the ripe seeds which implies that it can be considered as a potential source of carbohydrate for energy. It is a potential raw material for feed formulation since it can aid good bowl movement and improves absorption, (Onwuka, 2005).

The results of the phytochemical screening are presented in table 4.3. The phytochemical analysis were carried out on prepared sample extracts of ripe and unripe pawpaw seeds to ascertain the presence of the phytochemical components present in the respective seeds. Tannins and terpenoids were present in extract of unripe seeds. According to David (1983), saponins have expectorant action through stimulation of a reflex of the upper digestive tract. Saponins also reduces blood cholesterol by preventing its re absorption. They also possess antitumor and anti-mutagenic activities and can lower the risk of cancer in human by preventing cancer cells from growing (Esan 2014). The presence of tannins showed that the extract is rich in polyphenolic compounds these are antioxidants which could prevent cellular damage.

The results in the analysis to determine the metabolites, results show that the unripe pawpaw seeds has higher number of positive results than the ripe pawpaw seed indicating higher presence of the metabolites examined, Hence from the results of the analysis shown in primary metabolites the ripe pawpaw seed has the higher positive than the unripe pawpaw seed while in secondary metabolites the unripe pawpaw seed has the higher positive results than the ripe pawpaw seed.

The results of some selected mineral

contents of both the ripe and unripe seeds are shown in table 4.2, the result shows that the ripe pawpaw seed have higher mineral contents than the unripe, minerals like calcium which helps keep the bone and teeth strong, also body cell uses calcium to activate certain enzymes and help to transport ions across the cellular membrane. It also plays a key role in maintaining the regular heart-beat. The presence of these ions is important in the diet of pregnant women, nursing mothers, infants, convulsing patients and elderly people to prevent anemia and other related diseases. The mineral contents of some commonly consumed Nigeria foods and the values obtained in this present work is in agreement with those reported in similar works as seen in Brown K. H, et al, 1993 and Oluyemi E A et al, 2006.

CONCLUSION

The phytochemicals, proximate and mineral composition of ripe and unripe pawpaw seeds have been evaluated in this study. It was observed in this study that these seeds which are often disposed, causing environmental problems contained essential nutrients that can be user human and animals. These seeds' extract are applicable as counter irritant carminative, and can be used as an antifertility agent.

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