

NUTRITIONAL AND ANTI-NUTRITIONAL COMPOSITION OF PAW-PAW (*Carica papaya*) AND WATERMELON (*Citrullus lanatus*) SEEDS; A COMPARATIVE STUDY.

ABSTRACT

The quest for more nutrition source among underutilized fruits parts has spurred the comparative analysis of the nutritional and anti-nutritional composition of paw-paw (*Carica papaya*) and watermelon (*Citrullus lanatus*) seeds. Although the pulp of these fruits were known, but not much was known about the seeds. The results of the analysis which was carried out using conventional method showed that the paw-paw (*Carica papaya*) and watermelon (*Citrullus lanatus*) contain both phytochemicals, nutritional and anti-nutritional compounds. For paw-paw seeds, the factors analyzed include moisture, ash, fiber, protein, fat and oil, vitamin C, vitamin E, saponins, flavonoids, tannins and oxalate contents which have the following values of 72.07 %, 23.19 %, 3.50 %, 0.35 %, 7.34 %, 0.076 mg/100 g, 8.767 mg/ml, 1.00 %, 0.056 %, 191.03 mg/ml and 2.28 mg/100g respectively. While for watermelon, the values of the analyzed parameters including moisture, ash, fiber, protein, fat & oil, vitamin C, vitamin E, saponins, flavonoids, tannins and oxalate contents have the following values of 48.18 %, 23.54 %, 15.92 %, 0.00 %, 25.35 %, 1.25 mg/100 g, 7.22 mg/ml, 0.095 %, 0.014 %, 3.20 mg/100 g and 364.3 mg/ml respectively. The result presented the seeds of paw-paw and watermelon as nutritional base for some nutrients for ethno medicine and other potential uses.

Keywords: Nutritional, Anti nutritional, Paw-paw, Watermelon, Seeds, Phytochemical, Analysis

INTRODUCTION

The relevance of fruits and the need to introduce more plant food in order to bridge the gap of alarming food shortage in human nutrition have aroused attention of various researchers throughout the world especially in Nigeria into evaluation of nutritional and anti-nutritional status of various fruits and their seeds (Anhwange *et al.*, 2004; Hassan *et al.*, 2004). Some diseases such as diabetes, obesity, cancer, and cardiovascular diseases are manifesting in developing countries than ever before; and are due to inadequate consumption of fruits and vegetables. If this trend continues, world health organization (WHO) projected that, the percentage of people living with diabetes alone in developing countries will rise by 170% by the year 2025 (Ganry, 2008). Human beings required food to grow, reproduce and maintain good health without food, our bodies could not stay warm, build or repair tissues or maintain a heartbeat (Shiundu KM. 2002).

Fruits such as pawpaw, watermelon and pumpkins provide large quantities of carotene, vitamin and minerals in quantities high enough to provide the body with its needs (Fraser *et al.*, 2006). They have been linked to the management of anaemia because of their vitamin C content. When consumed with meals, they enhance iron status of the individual their high content of vitamin C improves absorption of iron (Wardlaw *et al.*, 2007).

Watermelon, *Citrullus lanatus* is a tropical fruit which grows in almost all part of Africa and South East Asia (Koocheki *et al.*, 2007). It belongs to the family of cucumber (*Cucurbitaceae*). *Citrullus lanatus*. Its cultivation has extended to tropical and subtropical regions on the American continent (Koocheki *et al.*, 2007). The *Citrullus lanatus* plant is a herbaceous creeping plant of the botanical family *cucurbitaceous*, which produces from 3 to 5 fruits weighing from 3 to 10 kilogram.

Citrullus lanatus fruit is round, oval or oblong, with a light green to very dark green skin, variously patterned or striped and red, yellow or orange flesh (Dane *et al*, 2007). The seeds are flat and smooth, varying in size and may be white tan, brown, black red, green or mottled (The *Citrullus lanatus* fruit has a smooth exterior rind (green, yellow and sometimes white and a juicy, sweet interior flesh). The rind is used in preserves, jellies and also serves as a good source of phytochemical and lycopene, a red carotenoid pigment which acts as antioxidant during normal metabolism and protects against cancer (Perkins *et al*, 2004, He *et al*, 2006). *Citrullus lanatus* can be used for smoothies, sorbets or granite depending on the texture whether smooth or coarse. The de-skinned and de-fruited rind is cooked with olive oil, garlic, chilli pepper, scallions, sugar and rum (Umar *et al*,).

Paw paw is the fruit of the plant *Carica papaya*, the sole species in the genus *Carica* of the plant family Caricaceae. It is native to the tropics of the Americas, perhaps from southern Mexico and neighbouring Central America. The papaya is a large, tree-like plant, with a single stem growing from 5 to 10 m (16 to 33 ft) tall, with spirally arranged leaves confined to the top of the trunk. The lower trunk is conspicuously scarred where leaves and fruit were borne. The leaves are large, 50–70 cm (20–28 inches) in diameter. Unusually for such large plants, the trees are dioecious. The tree is usually unbranched, unless lopped etc. The fruit is ripe when it feels soft (as soft as a ripe avocado or a bit softer) and its skin has attained amber to orange hue. Papaya is considered one of the most beneficial fruits as a good source of nutrients, fibre, and proteolytic enzymes. Its consumption has been attributed to aid digestion. (Mezhlumyan *et al.*, 2003; Tripathi *et al.*, 2010, Rolls, 2004).

The objective of this study is to evaluate the Nutritional and Anti-Nutritional Composition (Phytochemicals, proximate and total antioxidant) of Watermelon, (*Citrullus lanatus*) and Paw paw (*Carica papaya*) seeds

MATERIALS AND METHOD

Collection and Processing of Plant Materials

The samples of the fruits used in this study were purchase at New Market in Enugu State and was identified by a taxonomist and registered in the herbarium of Environmental biology of Institute of Management and Technology Enugu. The samples were later washed with distilled water to remove dirty particles and the seeds extracted from the fruits. These seeds of the fruits were washed with distilled water, air dried for 5 hours and then oven dried for 8 hours at temperatures between 70 °C and 90 °C afterward was grinded to powdery form. After grinding, 5 grams of the watermelon seed (sample A) was weighed into in a washed dried bottle labeled A another 5 grams of grinded paw-paw seed (sample B) was weighed and poured inside a washed dried bottle labeled B for further analyses. The phytochemical, proximate and total antioxidant analyses were carried out in the laboratory of Project Development Agency (PRODA) Emene, Enugu, Enugu State Nigeria.

Analytical Methods

The phytochemical which involve the determination of phenol, alkaloid, terpenoids was done using the method described by Harborne (1973), steroid was determine using Okeke and Elekwa

(2003) method, tannin and flavonoids was determined using Boham and Kocipai (1994) method. saponin was determine using Obadoni and Ochuko (2001) method, Cynogenic glycoside was determine using Van-Burden and Robbinson (1981) method, proximate analysis was carried out using AOAC (2002) and total oxidant determination was carried out using the method described by AOAC (2002).

RESULTS AND DISCUSSION

Phytochemicals

Table 1: The comparison of the qualitative analysis of paw-paw and watermelon seeds using different solvents

Parameters	Water		Methanol		N-hexane		Acetone		Diethyl ether		Ethanol	
	A	B	A	B	A	B	A	B	A	B	A	B
Alkaloids	+	+	+	+	+	+	+	+	+	+	+	+
Tannins	+	-	+	+	+	+	+	+	+	+	+	+
Phenols	-	+	-	-	+	-	-	-	-	-	-	-
Steroids	+	-	-	-	-	-	-	-	-	-	-	-
Terpenoid	+	+	+	+	+	+	+	+	+	+	+	+
Glycosides	+	+	+	+	+	-	+	+	+	+	-	+
Saponin	+	+	+	+	+	+	+	+	-	+	+	+
Flavonoids	-	+	-	-	+	-	+	-	-	-	-	+

Sample A = paw paw seeds.

Sample B = Water melon seeds

Proximate Analysis

Table 2: The comparison of the proximate composition of paw-paw and watermelon seeds.

Name fruits	Moisture content	Ash content	Crude fiber	Protein	Fat and Oil	Carbohydrate
Pawpaw	72.07	23.19	3.50	0.35	7.34	43.70
Water melon	48.18	23.54	15.92	0.00	25.35	65.50

The fat and oil content of the pawpaw seed were 7.34 while a watermelon seed was 25.35. The moisture content of the pawpaw seed was 72.07 while watermelon seed was 48.18. The Ash content of pawpaw seed was 23.19 while watermelon seeds were 23.54 crude fiber of the pawpaw seeds was 3.50 while crude fiber of the watermelon was 15.92, protein of the pawpaw seed was 0.35 while protein of watermelon seed was 0.00.

Table 3: The comparison of the photochemical analysis composition of paw-paw and watermelon seeds.

Samples	Parameters (%)						
	Tannin	oxalate	Steroids	Saponin	Glycosides	Flavonoids	Terpenoids
Paw paw	191.03	2.28	0.17	1.00	0.09	0.056	1.05
Water melon	3.20	364.30	N.D	0.092	0.01	0.014	N.D

The saponins of the pawpaw seed was 1.00, the saponins while that of watermelon was 1.25. The flavonoids of the pawpaw seed was 0.056 and that of watermelon seed was 0.014, tannins of the pawpaw seeds was 191.03 while tannins of the watermelon seeds was 3.20, oxalate of the pawpaw seed was 2.28 while oxalate of watermelon seeds was 364.30.

This result in Tables 2 and 3 showed that the paw-paw and watermelon have safe and adequate dietary nutrients if consumed in the right proportion and the anti-nutrients composition are within tolerable level.

Vitamins

Table 4: The comparison of the result vitamin composition of paw-paw (*Carica papaya*) and watermelon (*Citrullus lantana*) seeds.

Sample	Vitamin A (mg/g)	Vitamin C (mg/l)	Vitamin E (mg/g)
Paw paw	6.99	0.076	8.767
Water melon	6.72	1.25	7.22

From the result of this study, it was observed that the samples under study is made up of both phytochemicals and anti-nutritional compounds in various proportion. For paw-paw seeds the values of the analyzed moisture, ash, fiber, protein, fat & oil, vitamin C, vitamin E, saponins, flavonoids, oxalate and tannins contents have the following values of 72.07 %, 23.19 %, 3.50 %, 0.35 %, 7.34 %, 0.076 mg/100g, 8.767 mg/ml, 1.00 %, 0.60 %, 0.056 %, 2.28 mg/100 g and 191.03 mg/ml respectively. And the seeds of watermelon, the values of the analyzed moisture, ash, fiber, protein, fat & oil, vitamin C, vitamin E, saponins, flavonoids, tannins and oxalate contents have the following values of 48.18 %, 23.54 %, 48.18 %, 20.54 %, 15.92 %, 0.03 mg/100 g, 7.22 mg/ml, 7.22 %, 1.00 %, 0.026 %, and 0.014 mg/ml respectively.

CONCLUSION

From the research, it's been established through the experimental study that the seeds of both paw-paw and watermelon contains considerable amounts of photochemical and anti-nutritive factors. Some of the functional importance of nutrients in the body are as follows; carbohydrates supplies energy and assists in the utilization of fats, protein helps in the building and repair of body tissues, fats supplies energy and aids in the absorption of fat-soluble vitamins A, D, K, E, while fiber plays a vital role in lowering body cholesterol and also promotes regulation importance for normal bowel function. The major function of anti-nutrients is that they are natural or synthetic compounds that interfere with the absorption of nutrients.

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