



**Phytochemical Screening, Proximate and Vitamin Composition of *Cucumis melo* Seeds
(Sweet Melon)**

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ABSTRACT

The *Cucumis melo* seeds were analyzed for their proximate, vitamin and phytochemical compositions. The results of the phytochemical screening of the *Cucumis melo* seeds indicated the presence of alkaloids, flavonoids, tannins, glycosides, steroids, terpenoids, saponins and Phenols. The quantitative analysis for total alkaloids, saponins and flavonoids

contents shows *Cucumis melo* contained 30.42% alkaloids, 5.69% flavonoids and 1.325% saponins. The proximate composition results showed that the mean nutritional content of the *Cucumis melo* seeds contained (3.85±0.02) moisture (3.30±0.01) ash, (10.55±0.01) crude fibre, (24.50±0.05) crude protein, (35.45±0.05) crude lipid, and (22.35±0.05) carbohydrates contents. It can be concluded from the present study that the seeds of *Cucumis melo* possess various phytochemicals which are known to have medicinal properties including anticancer, anti-malarial, anti-diuretic, anti-pyretic, anti-microbial, antifungal activities among others. The proximate analysis also shows that the seeds of *Cucumis melo* have high fibre, proteins and lipids contents. The ash content also indicates that the seeds of *Cucumis melo* contain some minerals. Also the seeds of *C. melo* revealed the presence of some vitamins such as vitamin A (15.13 mg/100g), C (16.36mg/100g), B1 (0.13 mg/100g), folic acid (0.043 mg/100g). Thus, *Cucumis melo* seeds can be used as food supplements.

Keywords: *Cucumis melo*, phytochemical, proximate, vitamin, seed, composition.

1. INTRODUCTION

The crop *Cucumis melo* belongs to the family of Cucurbitaceae or Cucurbit. Other members of this family of plants include cucumber, pumpkin, squash, calabash, chayote etc. They are creeping in nature and are also warm season crops, very susceptible to cold injury. The stems of *Cucumis melo* are usually trailing up to 3m in length (Grubben, 2004). The fruit is a fleshy berry that is round to ellipsoid, hairy during its early development, and smooth to reticulate at maturity, which varies in colour, showing shades of yellow, green, orange, white, and often mottled or striped; the flesh is also variable and usually yellow, orange, pink, white, or green and somewhat crispy when bitten. *Cucumis melo* weighs 0.4-2.2kg, bear many seeds, tastes and smell sweet, (Grubben *et al.*, 2004, Lu *et al.*, 2011, Reznicek *et al.*, 2011).

In recent years, there has been a worldwide trend towards the use of the natural phytochemicals present in berry crops, teas, herbs, oilseeds, beans, fruits and vegetables for herbal medicine which is relatively affordable medicine (Kitts *et al.*, 2000, Wang *et al.*, 2000 Museliks *et al.*, 2007,). These phytochemicals contain secondary metabolites and have been used by humans to treat health disorders, illness and infection. Secondary metabolites are organic compounds that are not directly involved in the normal growth, development, or reproduction of an organism but carry out protective functions in the human body. Seeds of plants are a good source of food for both animals and humans, since they contain nutrients necessary for plants growth, as well as many healthy fats, such as omega fats.

2. MATERIALS AND METHODS

2.1 Sample collection

Cucumis melo fruits were bought from new market Wukari, in Taraba State, Nigeria and were identified and authenticated by Dr Mrs. Shingu from Crop production Department, Federal University Wukari.

2.2 Sample preparation

C. melo fruits were cut open and the seeds removed, the seeds were washed properly under running water to remove the rind and juices stuck to the seeds, they were air dried for 2 weeks followed by oven-drying at a temperature of 40°C before been pulverized with an electric blender and stored in airtight containers for further work.

2.3 Serial exhaustive extraction

Cold maceration was used in the extraction by serial exhaustive extraction method which involves successive extraction with solvents of increasing polarity from non-polar to a more polar solvent. The solvents employed in the extraction include hexane, chloroform, ethyl acetate, acetone, ethanol and water. This was to ensure that a wide polarity range of compounds were extracted. The extracts of the seeds were prepared by soaking 200 g pulverized *Cucumis melo* seeds in n-hexane in an airtight container for 4 (four) days with frequent agitation until soluble matter were dissolved. The resulting mixture was filtered using Whatmann No.1 filter paper and the filtrate was concentrated by evaporation using rotary evaporator. The procedure was repeated on the residues using chloroform, ethyl acetate, acetone, ethanol and water sequentially in order of increasing polarity (Ahmed *et al.*, 2017).

2.4 Phytochemical screening

The preliminary phytochemical analysis of the extracts were carried out to ascertain the secondary metabolites present in *Cucumis melo* seeds using standard method described by Sofowara (1990), Trease and Evans (1989), Harborne (1973).

2.5 Test for alkaloids

0.5 ml of the extract was measured into a 100 mL conical flask containing 2 ml of 5% H₂SO₄ in ethanol. The mixture was heated to boiling in a water bath and was allowed to cool and then tested for the presence of alkaloids

2.6 Mayer's test:

2ml of filtrates were treated with Mayer's reagent. Formation of a yellow cream precipitate indicates the presence of alkaloids.

2.7 Wagner's test

2 mL of the filtrates were treated with Wagner's reagent. Formation of brown/reddish brown precipitate indicates the presence of alkaloids

2.8 Test for flavonoids

2.8.1 Lead acetate test

2 mL of extracts were treated with 4 mL of 10% lead acetate solution. Formation of yellow colour precipitate indicates the presence of flavonoids.

2.9 Test of terpenoids

2.9.1 Salkowski's test

1 g of each extract was mixed with 2 mL of chloroform, and 2 mL of concentrated H₂SO₄ was carefully added to form a layer. An appearance of a reddish brown color interface indicated the presence of terpenoids.

2.10 Test of phenols

2.10.1 Ferric chloride test

10 mg extract is dissolved in 2 ml of distilled water. To this few drops of neutral 5% ferric chloride solution are added. A dark green colour indicates the presence of phenolic compound.

2.11 Test of glycosides

To 2 ml of extract with dilute HCl and 2 ml Sodium nitropruside in pyridine and sodium hydroxide solution were added. Formation of pink to blood red color indicates the presence of Cardiac glycosides.

2.12 Test of tannins

2 mL of extract was mixed with 2 mL of water and heated on a water bath. The mixture was filtered and ferric chloride was added to the filtrate. A dark green colour was formed. It indicates that the presence of tannins.

2.13 Test of saponins

2.13.1 Foam test

About 0.5 mg of the extract was shaken with 5 mL of distilled water in a test tube and warmed. The formation of stable foam was taken as an indication of the presence of saponins.

3. QUANTITATIVE DETERMINATION

3.1 Estimation of alkaloids

Determination of alkaloids was done by using Harborne (1973) method. 5 g of the sample was weighed into a 250 mL beaker and 200 mL of 10% acetic acid in ethanol was added and covered and allowed to stand for 4 hrs. It was filtered and the extract was concentrated on a water bath to one quarter of the original volume. Concentrated NH₄OH was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitate was collected and washed with dilute NH₄OH and then filtered. The residue is the alkaloid, which was dried and weighed.

3.2 Estimation of flavonoids

10 g of plant sample was repeatedly extracted with 100 mL of 80% aqueous methanol at room temperature. The whole solution was filtered through a Whatmann No.42 filter paper into a pre weighed 250 mL beaker. The filtrate was transferred into a water bath and allowed to evaporate to dryness and weighed (Krishnaiah *et al.*, 2009).

3.3 Estimation of total saponins

The method used was that of Obdoni and Ochuko (2001). The samples were ground and 20 g of each were put into a conical flask and 100 mL of 20% aqueous ethanol were added. The samples were heated over a hot water bath for 4 h with continuous stirring at about 55°C. The mixture was filtered and the residue re-extracted with another 200 mL 20% ethanol. The combined extracts were reduced to 40 mL over water bath at about 90°C. The concentrate was transferred into a 250 mL separation funnel and 20 mL of diethyl ether was added and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded.

The purification process was repeated. 60 mL of n-butanol was added. The combined n-butanol extracts were washed twice with 10 mL of 5% aqueous sodium chloride. The remaining solution was heated in a water bath. After evaporation the samples were dried in the oven to a constant weight; the saponins content was calculated.

3.4 Proximate analysis

The pulverized seeds were taken for proximate analysis. The dry matter, moisture, ash, crude fat, crude protein (nitrogen x 6.25) and crude fibre contents were determined using the standard methods of the Association of Official Analytical Chemists (AOAC, 2000). Carbohydrate content was estimated based on the net difference between the other nutrients and the total percentage composition.

4. RESULTS AND DISCUSSION

Table 4.1 and 4.2 show the results of preliminary phytochemical analysis and quantitative determination of some phytochemicals constituents of the seeds of *Cucumis melo*. It revealed the presence of eight phytochemicals in the screened sample.

Table 4.1: Result of phytochemical screening of *Cucumis melo* seeds

	Hexane extract	Chloroform Extract	Ethyl acetate Extract	Acetone Extract	Ethanol Extract	Aqueous extract
Alkaloids	+	-	+	+	-	-
Flavonoids	-	+	+	-	-	-
Tannins	+	-	-	-	-	-
Glycosides	-	+	+	-	+	-
Steroids	+	+	-	+	-	+
Phenols	-	-	-	+	-	-
Terpenoids	+	+	+	-	+	-
Saponins	+	+	+	+	-	+

(+)=Present, (-)=Absent

Table 4.2: Result for quantitative determination of some identified phytochemical constituents in *Cucumis melo*

Alkaloids (%)	Flavonoids (%)	Saponins (%)
30.412	5.693	1.325

Alkaloids were detected in hexane extracts, ethyl acetate and acetone but absent in ethanol, chloroform, and aqueous extracts. The concentration of alkaloids present in the *Cucumis melo* seed is (30.412 %) which is within the range (33.795 ± 0.035) reported by Damilola *et al.* (2015) for *Citrullus lanatus* seeds. Alkaloids are known to have muscle

relaxant property and can be utilized for their analgesic, antispasmodic and bactericidal effects (Stray, 1998; Okwu and Okwu, 2004).

Saponins were detected in hexane, ethylacetate, acetone, chloroform, and aqueous extracts but absent in ethanol extract. The presence of saponins in the seeds can be useful in treating inflammation. Saponins have the property of precipitating and coagulating red blood cells. Some of the characteristics of saponins include formation of foams in aqueous solutions, haemolytic activity, cholesterol binding properties and bitterness (Rita *et al.*, 2015). Also in nature, saponins appear to act as antibiotics that protect plants from microbes.

Flavonoids were detected in chloroform extract and ethylacetate extracts but absent in hexane, acetone, ethanol and aqueous. The value of flavonoids found in *C. melo* is 5.693 %. Flavonoids in plants comprise a vast array of biologically active compounds which have been used in traditional medicine for many years and have antioxidant and anti-proliferative effects especially against chronic inflammatory and allergic diseases, breast cancer and coronary artery disease (Ochwang'I *et al.*, 2016). They are also potent water-soluble antioxidants and free radical scavengers, which prevent oxidative cell damage, have strong anticancer activity (Okwu *et al.*, 2006).

The screening revealed the presence of tannins only in hexane extract but absent in all other extract. Tannins are astringent in taste and help in healing of wounds and inflamed mucous membrane (Njoku & Akumefula, 2007). Tannins decrease the bacterial proliferation by blocking key enzymes at microbial metabolism. Hence, the seeds could act as an efficient antimicrobial drug (Pradeepa *et al.*, 2016). Tannins also interfere with protein synthesis.

Terpenoids were detected in hexane, ethylacetate, acetone, chloroform, and ethanol extracts but absent in aqueous extract. Terpenoids are antifungal and antibacterial which is attributed to their membrane disruption action and inhibitory action on bacterial cell or fungus (Tawheed and Monika, 2014).

Steroids were detected in hexane, chloroform, acetone and aqueous extract but absent in ethanol and ethyl acetate extract. Steroids in plants have been shown to exhibit analgesic properties and responsible for central nervous system activities (Ahmed and Mohammad, 2014).

Glycosides were detected in ethylacetate, chloroform and ethanol extracts but absent in acetone, hexane extract and aqueous extracts. Glycosides are beneficial in reducing inflammation, protecting against endotoxemia and may be used in cardiac treatment of congestive heart failure (Tawheed and Monika, 2014). Phenols are present only in acetone extract and absent in all other extracts.

5. PROXIMATE ANALYSIS

Table 5.1 Results for proximate analysis of *Cucumis melo*

Sample type	Moisture content (%)	Ash content (%)	Crude fibre (%)	Crude protein (%)	Crude lipid (%)	CHO (%)
<i>Cucumis melo</i>	3.85	3.30	10.55	24.50	35.45	22.35

The proximate composition of *C. melo* seeds is presented in Table 5.1. The result revealed that the seeds of *C. melo* contained 3.85% moisture, 35.45% crude lipid, 34.50% crude protein, 10.55% crude fiber, 3.30% ash and 22.35% carbohydrate. *C. melo* seed was found to have high crude lipid content 35.45 which is higher than that reported by Betty *et al.*, (2016) for three varieties of water melon; Charleston gray (26.83±4.24), Crimson Sweet (26.50±4.27) and Black diamond (27.83±2.63) and lower than that reported for *Cocos nucifera* linn (48.80±0.38) and *Cococynthis citrullus* (50.42±0.52). The high crude lipid content found in the seeds is an indication that the seeds could be source for good, cheap and novel source of oils that would be utilized for both domestic and industrial purposes. Crude lipids are essential due to the ability to provide the body with maximum energy (Otutu *et al.*, 2015). The protein contents of obtained in the *C. melo* is high and similar to what has earlier reported by Damilola *et al.*, (2015). Proteins are essential component of the diet needed for survival of animals and humans, which function basically in nutrition by supplying adequate amounts of required amino acids Therefore, *C. melo* seeds could be recommended

as protein supplement. The presence of seed coat (shell) in the ground seed used for analysis accounted for the high fiber content of the seeds under study (10.55%). Crude fibre is a significant component in the body. It increases stool bulk, and decreases the time that waste materials spend in the gastrointestinal tracts. Crude fibre in the diet consists mostly of the plant polysaccharides that cannot be digested by human dietary enzymes such as cellulose, hemicelluloses and some materials that make up the cell wall. This suggests that C.melo seeds would provide additional dietary fibre in the diet. The ash content of C. melo seeds in the present study (3.30%) is higher than that of earlier report (2.4%) by Yanty *et al.*, (2008). The moisture content value of C. melo seeds was obtained to be 3.85% much higher than those reported for kersting's groundnut ($1.7 \pm 0.12\%$) and cranberry bean ($1.7 \pm 0.51\%$) (Aremu *et al.*,2006) but lower than those reported for Luffa cylindrical (5.8%) (Olaofe *et al.*, 2008) and fermented *Brachystegiaeurycoma* (4.32%) (Aremu *et al.*,2014). The high moisture content could make the C.melo seeds highly susceptible to microbial attack. The carbohydrate content of C.melo seeds was obtained to be 22.35%.The carbohydrate content obtained from the present study is similar to value of previous work (23.18%) reported by (Loukou *et al.*,2007)

Table 5.2 Results of Vitamins composition of Samples (mg/100g)

S/N	Vitamins	Composition (mg/100g)
1	A	15.13
2	C	16.36
3	B1	0.13
4	Folic acid	0.043

The vitamin composition of C. melo seeds is presented in Table 5.2. The result revealed that the seeds of C. melo contained vitamin A (15.13 mg/100g), C (16.36mg/100g), B1 (0.13 mg/100g), folic acid (0.043 mg/100g). Vitamin C is also known as ascorbic acid, it is involved in the repair of tissue, prevent and treat scurvy. It also functions as an antioxidant and it is required in the functioning of several enzymes. Julia *et al* (2010) reported that citrus lemon contains (26.2 ± 4.8 mg/100g of vitamin C, C. sinensis contains (27.7 ± 2.7 mg/100g) and *Mangifera indica* has (11.0 ± 3.6 mg/100g) content of vitamin C. Vitamin B1 content in *Cucumis melo* seeds is 0.13 mg/100g which is within the range reported by Fatima *et al* (2013) for *Hibiscus esculentum* (Okra) 0.14 mg/100g and *Musapara disiacca* (Banana) 0.18mg/g. Thiamin can only be stored in the body for a short time before it is readily excreted, a regular dietary intake of thiamin is necessary to maintain proper blood levels. The recommended daily intake (RDI) for adults over age eighteen is 1.2 mg/day for men and 1.1 mg/day for women. For children, adequate intake levels are lower, with RDI levels at 0.2 mg/day during early infancy that steadily increase with age. Women of any age who are pregnant should increase their daily intake of thiamin to 1.4 mg/day (Fatima *et al.*,2013). Folic acid content in *Cucumis melo* is 0.043 mg/100g. Elzbieta *et al* (2014) reported the presence of folic acid in orange juice ($105, 0 \pm 3,09$ μ g/100 ml) and apple juice ($21,4 \pm 2,94$ μ g/100 ml). Regular consumption of folic acid can reduce the risk of neural tube defects in newborns. It is highly recommended to women of childbearing age. Vitamin A content in *Cucumis melo* is 15.13. Praveen (2012) reported the presence of Vitamin A (54.00) in blue berries and (60.00) in cranberry. Vitamin A is essential for adequate growth, cell and tissue differentiation, vision, development and functioning of the immune system.

6. CONCLUSION

This study has revealed that the seeds of *Cucumis melo* contain nutritional components and vitamins which are essential to the body and can serve as food supplement. Also it indicated the presence of some phytochemical components which include;alkaloids, flavonoids, tannins, glycosides, sterioids, phenols, terpenoids, and saponins. These phytochemicals contain medicinal properties such as anticancer, antitumor, anti-malarial, anti-diuretic, anti-pyretic and also have antimicrobial activities. They can be used in treatment of variousdiseases.

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