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# Proximate Analysis of Watermelon Seed and Physicochemical Analysis of Its Oil

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***Abstract:***
*The objective of this research work is to determine the Proximate Analysis of watermelon seeds, and to investigate the physiochemical analysis of it oil. The fresh watermelon seeds collected from sellers within Sokoto town were washed with clean water, sun-dried for three days and powdered. Oil was extracted from the grinded seed samples using Soxhlet extraction. The Proximate Analysis of the seed showed that the seed had a moisture content of 4.3±0.29%, Ash content 3.6±0.29%, Crude Lipid 0.26±0.14%, Crude Protein 14.6±0.41%, Crude fibre 1.52±0.83%, Available Carbohydrate (54.4±1.17%) and Nitrogen 2.3±0.07. The physiochemical Analysis of the oil showed that the high oil yield coupled with a partially high concentration of Fatty Acid makes the seed suitable as Food Supplement. It also enjoys Applications as industrial ingredients in soap production, cosmetic, and form ingredients.*

***Keywords:*** *Proximate analysis, watermelon seed oil, physicochemical analysis*

## 1. Introduction

Watermelon is a special fruit referred to by Botanists as a pepo, a berry which has a thick (exocarp) and fleshy (mesocarp and endocarp) center. pepos are derived from an inferior ovary and are characteristic of the cucurbitaceae Daniel and Maria, (2000).

Dane and Liu (2007); Zaiden et al. (2005) and Baker (2008) suggested on the basis of chloroplast DNA investigations that, the cultivated and wild water melon appears to have diverged independently from a common ancestor with more than 1200 varieties of watermelon ranging in size, with red, orange, yellow or white flesh. The use of watermelon in human or animal nutrition lies in its nonpoisonous nature and nutritive value (Martin et al., 2007). The chemical compounds contained in plant provide energy, repair tissue, build new cells and provide protection for the body (Vohra Kaur, 2011). Watermelon has a rich potassium content that is useful in cleansing the toxic depositions of kidneys, it lowers the amount of uric acid in the body, thus reducing the risk of kidney problems and development of renal calculi. In addition, its high water content encourages frequent urination thereby useful for kidney cleansing. Zaragoza (2015) reported that Citrullus lanatus has values of 125.00, 0.40, 7.00, 30.21 and 0.75 (mg/g) for K, Fe, Ca, Mg and Zn respectively. Akah and Nwambie (1994); Lakshmi and Kaul (2011) reported the presence of antioxidants in the water melons and suggested its use as a remedy in kidney-related health diseases. According to Kimbonguila et al. (2010), Magnesium and Calcium plays a significant role in carbohydrate metabolism, photosynthesis, nucleic acids and binding agents of cell walls. Calcium assists in teeth development. Magnesium is an essential mineral for enzyme activity, like calcium and chloride;

magnesium also plays a role in regulating the acid-alkaline balance in the body. Phosphorus is needed for bone growth, kidney function and cell growth. It also plays a role in maintaining the body's acid-alkaline balance.
A great deal of magnesium and potassium found in melons are incredibly good in reducing the blood pressure level (Dane and Liu, 2007). The high carotenoid content in the fruit protect walls of arteries and veins from hardening, thus helping to lower blood pressure (Dane and Liu, 2007).

Alongside tomatoes, water melon is believed to be among high lycopene foods. Lycopene is a carotenoid phytonutrient that is especially important for our cardiovascular health, and believed to be important for bone health as well (Poduri et al., 2012). Health scientists are becoming more interested in the citrulline content of watermelon. Citrulline is an amino acid that is commonly converted by human system in to arginine (an amino acid). According to Cho et al. (2004), the flesh of water melon contains about 250mg citrulline and arginine, ahigh level of which can help improve blood flow and other strengthen cardiovascular health.

Some preliminary evidence from animal study show that greater conversions of citrulline into arginine may help prevent excess accumulation of fat in the cell due to block activities of enzymes called alkaline phosphates (Poduri et al., 2012). There has been an increase in consumption of fresh extracted fruit juices of water melon because of availability of variety of fruits throughout the year. People have developed interest on freshly prepared fruitjuices due to their fresh taste and also because of being scared of preservatives and other added ingredients in industrially processed juices (Nonga et al., 2014; Ayoub et al. 2017).

## 2. Materials and Methods

### *2.1. Sample Collection and Treatment*

Eight ripe watermelon fruits were purchased within Sokoto metropolis. Seeds obtained from the flesh were washed and sun dried for three days. The dried seeds were grinded and packed in polyethylene bag for further analysis.
Extraction of Oil

350g of the seed powder was weighed on a weighing balance and used for oil extraction with 150cm$^3$ of n-hexane usingasoxhlet apparatus for 60 minutes.
The Proximate Analysis was carried out using the method of AOAC (1980) while the Saponification Value and Free Fatty Acid Values were determined using the methods of AOAC (1991) and AOAC(1990) respectively. The Acid Value, Iodine value and Peroxide values were determined using the method of AOAC, (1995).
Tests were run in triplicates and results were recorded as mean values.

## 3. Results

| Parameter | Composition (%) |
|---|---|
| Residual Moisture | 4.3±0.29 |
| Ash | 3.6 ±0.29 |
| Crude fiber | 1.52±0.83 |
| Crude protein | 14.6±0.41 |
| Available Carbohydrate | 54.4±1.17 |
| Crude lipid | 0.26±0.14 |
| Nitrogen | 2.3±0.07 |

*Table 1: The Results of Proximate Analysis of Watermelon Seed*
*Values are Mean ± Standard Deviation of Triplicate Data*

| Parameter | Description |
|---|---|
| Color | Yellowish Brown |
| Smell | Sweet smell |
| Oil yield (%) | 38.8 |
| Saponification Value (S.V) | 92.6 ± 1.35 |
| Iodine Value (I.V) | 4.9 ± 1.6 |
| Free Fatty Acids(FFA) | 70.6±1.5 |
| Acid Value (A.V) | 28.7±0.17 |
| Peroxide Value(P.V) | 0.0±0.0 |

*Table 2: The Result of Physicochemical Analysis of the Watermelon Seed Oil*
*Values are Mean ± Standard Deviation of Triplicate Data*

## 4. Discussion

Table 1 presents the result of proximate Analysis of watermelon seed. It can be observed that the seed contains primarily, carbohydrate and protein. The low moisture content of the seed (4.3±0.29) is an indication that it can be preserved for long, as Alhassan et al.(2018) reported that seeds with low moisture usually have a long period of preservation. High ash content of 9.7±0.12 compared to 3.6±0.29 was reported for Annona muricata by Kimbonguila et al. (2010). The compositions of crude fibre (1.52±0.83) and crude protein (14.6±0.41) fall below 14.67±0.22 and 17.92±0.27 reported by Umar et al. (2012) for the crude fibre and crude protein of white grubs (scarabidae) respectively. Alhassan et al. (2018),respectively reported values of available CHO (%DW) for B. bayad, O. niloticus and C. gareipinus as 1.20, 1.76 and 5.25 which are all below the value (54.4±1.17) for available carbohydrate in Table 1.Carbohydrates and proteins are important nutritional parameters. Carbohydrates provide energy and proteins function as building block for many parts of the body. George and Moiloa (2015) reported protein values as 1.19±0.05, 1.72±0.44 and 1.05±0.12g/100g for home-made apple juice, mixed fruit juice and commercial juice respectively. Consumption of the seed could therefore, augment protein and carbohydrate supplement in the body.The lower crude lipid value (0.26± 0.14) observed for water melon agrees with Alhassan et al. (2018), that oil yield in plants is low when compared to that of insects or animals.

Table 2 displays the result of physicochemical parameters analysed in the watermelon seed oil. The yellowish-brown color entails that the seed oil has similar visual appearance to other (most) edible oils.The oil yield (38.8%)obtained for watermelon seed oil(Table 2) is higher than 34.80±0.75 reported for Annona muricata by Kimbonguila et al. (2010). The low acid value was found to be 28.7±0.17 KOH/gwhich is a measure of the extent to whichhydrolysis liberates fatty acids to their ester linkages in parent glyceride molecules indicates a high storage quality which has been presumed from the low value of residual moisture in Table 1. The high levels of %FFA, in the oil sample investigated (Table 2), indicate that the oils are not stable, because they worsen easily via oxidative rancidity. The lower acid value of oil, the higher the storage quality and vice versa (Kimbonguila et al., 2010; Ekpete et al. 2013).

## 5. Conclusion

This study showed that the Citrullus lanatusseed is a good source rich in carbohydrate, protein and oil. The oil can be profitably extracted from the seed High unsaponifiable matters content guarantees the use the oils in cosmetics industry.

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