Chemistry Research Journal, 2017, 2(4):37-41

Available online www.chemrj.org

Research Article

ISSN: 2455-8990
CODEN(USA): CRJHA5

Determination of percentage yield of oil extracted from watermelon seeds (A case study of Mainok, Kaga local government Borno state)

Busuguma UA[1]* Jamila B Yakasai[2]

[1]Federal Ministry of Science and Technology, FCT, Abuja, Nigeria
[2]Department of Remedial Science, Ramat Polytechnic Maiduguri, Nigeria

Abstract The extraction of oil from watermelon was successfully conducted using soxhlet apparatus, some chemical and physical analysis of the oil was carried out, and the percentage of the oil is 46. 11%. The proximate and *physicio – chemical* analysis of watermelon seeds were carried out. The result showed that the seeds had produced yellow coloured oil with a pleasant odour, Ph value 7.7 and a Percentage yields 46.108.

Keywords Essential oil, Percentage yield, Watermelon, Berry

Introduction

Watermelon is a vain-like flowering plant originated from southern Africa. It is a large, spraying annual plant with course, hairlypinnately lobed leaves and white to yellow flowers. It is grown as water its edible fruit also known as a watermelon, which is a special kind of berry referred to by botanist as a pepo [1].

The fruit has a smooth hard ring, usually green with dark green stripe or yellow sports and a juicy sweet interior fresh usually deep red to pink, but sometimes oranges yellow or white with many seeds.

Watermelon is thought to have originated from South Africa, where it is found grown wide. It reaches maximum genetic diversity there, with sweet, bland and bitter forms. In the 19th century [2].

Origin of Watermelon

Water melon *(citrullus vulgaris),* family *cucurbitacceae* is a vine like flowering plant originally from south Africa, it's fruit which is called water melon botanist referred to as *pepo*, a *berny*which has thick and fleshy center *meso* carp and undo carp . *Pepos*are derived from an inferior ovary, and are characteristic of *cucurbitaceae* .Although not in the genus *cucumis* has a smooth exterior find (green, yellow and sometimes white and juicy, sweet interior flesh (usually deep red to pink but sometimes orange, yellow and even green if not ripe) [3].

Importance of Watermelon

The following are some of the importance of watermelon

- **Asthma prevention**: The risks for developing asthma are lower in people who consume a high amount of certain nutrients. One of these nutrients is vitamin C found in many fruits and vegetables including watermelon [4].
- **Blood Pressure**: Watermelon extract supplementation reduced ankle blood pressure, brachial blood pressure and carotid wave reflection in Obese middle aged adults with pre hypertension or stage 1

hypertension and that watermelon extract improved arterial functions. Deist rich in lycopene may help protect against heart disease [4]

- **Cancer**: As an excellent source of the strong antioxidant Vitamin C as well as other antioxidants, watermelon can help combat the function of free radicals known to cause cancer. Lycopene intake cancer prevention in several studies [5].
- **Digestion and regularity**: Watermelon because of its water and fiber content helps to prevent constipation and promote regularity for a healthy digestive tract [5].
- **Hydration**: It is made up of 92% water and full of important electrolytes, watermelon is a great snack to have on hand during the hot summer months to prevent dehydration [6].
- **Inflammation**: Choline is a very important and versatile nutrient in watermelon that aids our bodies in sleep, muscle movement, learning and memory. Cholines also help to maintain the structure of cellular membranes, aids in the transmission of nerve impulses, assist in the absorption of fat and reduces choline inflammation [7].
- **Muscle soreness**: watermelon and watermelon juice have been shown to reduce muscle soreness and improved recovering time following exercise in athletes researchers believes. This is likely do to the amino acid L- Citrulline contained in watermelon [7].
- **Skin**: Watermelon is also great for your skin because it contains vitamins A, a nutrient required for Sebum production that keeps hair moisturized, vitamin A is also necessary for the growth of all bodily tissues, including skin and hair. Adequate intake of vitamin C (one cup of watermelon provides 21% daily needs) is also needed for the building and maintenance of collagen, which provided structure to skin and hair. Watermelon also contributes to overall hydration, which is vital for having healthy looking skin and hair [8].

Types of Watermelon

In this country, farmers and horticulturists have developed hundreds of watermelon cultivar over the years; they vary widely in taste, texture, and colour. Here are some of the favourites.

- **Sugar baby:** They are comparatively small (9 to 13g) sugar baby is often referred to as an icebox watermelon. Developed in 1955, it has soft, sweet fruit and a dark green rind.
- **Extazy:** The pint- size extazy is a seedless melon that averages five pounds and is grown mostly in California and Arizona [9].
- **Yellow Baby:** This hybrid is similar to yellow doll in its rind pattern and the colour of its flesh; try the tender fruit in a salsa made with Jalapeño and tomotillo.
- **Moon and stars**: Sudden with a constellation of lemon coloured dots, this heirloom variety, which can weigh as much as 40 pounds, nearly disappeared only a few years after it was introduced, in the 1920 but has recently made a come ack.
- **Crimson sweet**: The amply proportioned crimson sweet is famous for its sugary, bright red flesh; it is a cross of the Charleston Gray, miles and peacock varieties and has a honeyed taste that pleasantly offsets feta and mint [10].
- **Starlight**: The pristine, amaratucoloured fruit of this mini cultivar glisters with juice. It's easily transportable and deeply satisfying.
- **Stars 'n' stripes:-**This hybrid, named for the green stripes streaking across its rind, has an elongated shape and it can weigh as much as 30 pounds; it is well loved for its firm, sweet, deeply coloured flesh.
- **Sweet favourite:** Dappled with light green patched on a blue-green rind, the sweet favourite has juicy, ruby-coloured fruit that's well suited to relishes and chutneys [11].

Watermelon *citrullus lanatus* (watermelon) belong to *cucurbitaceac* family, which consists of nearly 100 general and over 750 species [12]. They are widely distributed in the tropics and subtropics and a few species occur in

temperature region. Watermelon grows well in alluvial and sandy soils even in arid regions and coastal saline areas. In the gangatic plains, early sowing is done in November and extended up to February; in South and central India watermelon is grown almost throughout the year [13].

Watermelon is a major *cucurbit* crop that accounts for 6.8% of the world area (second behind tomato) devoted to vegetable production in 2005. A rough estimate of annual world value of watermelon exceeds $15 billion. The total production of cucumber, melon and watermelon has increased more than fourfolds in the last 40 years [14]. Watermelon is the most popular *cucurbits*, followed by cucumber and melon.

Watermelon is originally from Africa and grown in more than 96 countries world wide. China is the world leader in watermelon production with 70.3% of total production in 2005, other leading countries are Turkey (4.7%), Iran (2.3%), United States (2.2%) and Egypt (1.7%). Occupies 26th position in watermelon production [14].

Watermelon is an economically important fruit crop and valuable alternative source of water in desert areas. It is a good source of *Lycopene*, *Citrulline* and important minerals and vitamins. It has the highest *Lycopene* content among fresh fruits and vegetables; watermelon contains 60% more *Lycopene* then tomato. *Lycopene* in the human diet is associated with prevention of heart attacks and certain cancers. Rind of watermelon contains an important natural compound called *Citrulline*, an amino acid that the human body makes from food. *Citrulline* is found in high concentration in liver, and is involved with athletic ability and functioning of the immune system [15]. It is a good source of fiber, which is important for keeping digestive tract operating properly by preventing constipation, haemorrhoids and diverticular disease.

Aims and objectives of the study

The research work is geared towards determining the following

- To extract essential oil from watermelon seeds.
- To determine the percentage yield of the oil.

Significance of the Study

The outcome of the study will highlight important information on how much oil is obtained from watermelon seed with regard to the location the seed is obtained.

Scope and Limitation

This research work is limited to the determination of the percentage yield of oil extracted from watermelon seed obtained from Mainok, Kaga local government, Borno state.

Materials and Method

Sample Collection and Preparation

The watermelon seeds were collected from the farm at Mainok (a town under kaga local government area), Borno state. They were washed and rinsed with distilled water and allowed to dry up for three days under room temperature, after then the seeds were pounded into coarse powder using pestle and mortar.

Extraction of the Oil

The extraction was carried out using soxhlet extractor and petroleum ether as the solvent. 50g of the coarse powder was weighed and transferred into a white piece of cloth, it was then wrapped and placed into the percolating section of the soxhlet apparatus. The oil from the seed was then extracted with petroleum ether for 5hrs until no more oil was coming out from the sample.

The pure oil obtained was cooled in a water bath and stored in a desiccator. The flask was weighted (F_1), then the flask and the content were reweighed (F_2) so as to obtained the percentage oil extracted. The oil was stored in a refrigerator for subsequent analysis.

Percentage can be expressed as:

$$\text{Percentage yield} = \frac{Actual\ Yield}{Weight\ of\ Sample} X100 = \frac{F_1 - F_2}{S_1} \text{X } 100$$

Where:
Weight of the empty flask = F_1
Weight of the sample = S_1
Weight of the oil obtained plus Flask = F_2
Weight of the oil obtained = $F_2 - F_1$

Determination of the odour and colour of the oil

20ml of the oil sample was put inside a round bottom flask and heated for about 15mins using heating mantle. The odour from the oil was perceived and was found to be aromatic.

40ml of the sample was put inside the beaker and examined physically with the naked eyes. The colour of the oil was found to be yellow.

Results and Discussion

Table 1: The physical and chemical properties of watermelon seed oil.

Parameter	Properties
Colour	Yellow
Odour	Pleasant odour
Percentage yield	46.11

From the result obtained, it can be observed that the percentage yield of watermelon oil is 46.11%. This makes the seed a good source of oil. The physical and chemical properties were carried out in other to compare the oil with the standard.

Appendix

Sample Watermelon Oil

The percentage yield

Total mass of the pounded watermelon seed used is 500g weight of the oil extracted is 23.054 ml.

$$\text{Percentage yield} = \frac{Volume\ of\ oil}{Weight\ of\ Sample} X\ 100 = \frac{23.054}{500} x 100 = 46.108\% = 46.11\%$$

Therefore percentage yield = 46.11%

References

1. Krammer T. (2007). Nutritional quality in Atherton, J.G. and Rudich (eds): The watermelon crop Chapman and hall, London/ New York, 241-280.
2. Dhaka, L.H (2007). Book of Agriculture statistics Division, ministry of planning, Government of Bangladesh. Retrieved on the 7th of October.
3. Candolle H. (2008). Origin of cultivated plants (1882) pp 262ff, S.U. "watermelon".
4. Isaac Z. and Peter T. (2010). Vegetable Research & extension center- ice box watermelon 205-208
5. Dane I. and Fenny T. (2008). "Diversity and origin of cultivated and utron type watermelon (*Citricullus lanatus)"* Genetic Resources and crop Evolution 54 (6): 1255. doi: 10-1007/s/0722-006-9107-3.
6. Brickell A. and Christopher I. (Ed) (2009). The Royal Horticultural society Encylopedia of Gardening (print) London: Dorling Kindersley. P-33.ISBN 978-0-86318-979-1.
7. Vandermark T. (2009). Analytical characterization of Moringa watermelon seed oil Grown in Temperature Regions of Pakistan journal of Agriculture and food chemistry 51, 2003, 6558-6568
8. Lazos D. (2008). Journal of Cancer and metastasis Research. Retrieved on 2010 September 29 (3): 553-68 2010.

9. Pedro R.J (2009). The influence of water content on the up take of ions by roots 111 phosphate, potassium, calcium and magnesium up take and concentration gradient in soil. Journal of Applied Ecology, 13: 957-981
10. Zohary S., Daniel T. and Hopf M. (2008) Domestication of plants in the old world, third edition, Oxford University press p. 193, ISBN 0-19-850 357-1
11. Marynard T., David M. and Maynard N. (2012). "6: cucumbers, melons and watermelons".
12. Yamaguchi (2007). Watermelon, cream saskaskatchewan: seed savers. Achieved from the original on 21 February 2009.
13. Hosaka A. (2008). Analytical Agricultural chemistry, fourth edition, Kalya publishers new Delhi-Ludhiana.
14. Isaac L. (2009). (Association of official Analytical chemist) official methods of analysis. Ed Washington, DC: Association of official Analytical chemist 2009.
15. Perkins E. and John L. (2010) Nutrient Constituents from Eight lines of naked seed Squash *(cucubitapepol*). Pakistan journal of Agricultural science, Volume 63, 2012 No.4