Chief Editor
Dr. A. Singaraj, M.A., M.Phil., Ph.D.

Editor
Mrs. M. Josephin Immaculate Ruba

EDITORIAL ADVISORS
1. Prof. Dr. Said I. Shalaby, MD, Ph.D.
   Professor & Vice President
   Tropical Medicine,
   Hepatology & Gastroenterology, NRC,
   Academy of Scientific Research and Technology,
   Cairo, Egypt.
2. Dr. Mussie T. Tessema,
   Associate Professor,
   Department of Business Administration,
   Winona State University, MN,
   United States of America,
3. Dr. Mengsteb Tesfayohannes,
   Associate Professor,
   Department of Management,
   Sigmund Weis School of Business,
   Susquehanna University,
   Selinsgrove, PENN,
   United States of America,
4. Dr. Ahmed Sebihi
   Associate Professor
   Islamic Culture and Social Sciences (ICSS),
   Department of General Education (DGE),
   Gulf Medical University (GMU),
   UAE.
5. Dr. Anne Maduka,
   Assistant Professor,
   Department of Economics,
   Anambra State University,
   Igbariam Campus,
   Nigeria.
6. Dr. D.K. Awasthi, M.Sc., Ph.D.
   Associate Professor
   Department of Chemistry,
   Sri J.N.P.G. College,
   Charbagh, Lucknow,
   Uttar Pradesh, India
7. Dr. Tirtharaj Bhoi, M.A, Ph.D,
   Assistant Professor,
   School of Social Science,
   University of Jammu,
   Jammu, Jammu & Kashmir, India.
8. Dr. Pradeep Kumar Choudhury,
   Assistant Professor,
   Institute for Studies in Industrial Development,
   An ICSSR Research Institute,
   New Delhi- 110070, India.
9. Dr. Gyanendra Awasthi, M.Sc., Ph.D., NET
   Associate Professor & HOD
   Department of Biochemistry,
   Dolphin (PG) Institute of Biomedical & Natural
   Sciences,
   Dehradun, Uttarakhand, India.
10. Dr. C. Satapathy,
    Director,
    Amity Humanity Foundation,
    Amity Business School, Bhubaneswar,
    Orissa, India.

ISSN (Online): 2455-7838
SJIF Impact Factor: 6.093

EPRA International Journal of
Research & Development
(IJRD)

Monthly Peer Reviewed & Indexed
International Online Journal

Volume: 4, Issue: 1, January 2019
PROXIMATE ANALYSIS OF GUNA SEED OIL (CITRILLUS VULGARIS) PRODUCED IN GA'ANDA TOWN GOMBI LOCAL GOVERNMENT, ADAMAWA STATE NIGERIA

Edmond Moses 1
1Department of Chemistry, Modibbo Adama University of Technology Yola, Nigeria.

Bala Adamu Thliza 2
2Department of Chemistry, University of Maiduguri. P.M.B. 1069, Borno state Nigeria

Joseph Jauro Deshi 3
3Department of Chemistry, Modibbo Adama University of Technology Yola, Nigeria.

ABSTRACT
Guna seed oil was extracted through solvent extraction method. Percentage oil was found to be 57.40%. Saponification value was found to be 112mg/L. Iodine value was also calculated to be 10.16. Free fatty acid was also found to be 5.6%. Peroxide value was calculated to be 7.27mg/kg. Protein content was calculated to be 61%. Moisture content was calculated to be 5.00. More so, the total ash content was found to be 0.73. the crude fiber was found to be 6.67. Crude fats were found to be 12.00 and lastly, Carbohydrate content of guna seed oil was found to be 14.60%. All calculations ware done in accordance with the by the A.O.A.C. 1990, official methods of analysis. Washington DC.

KEYWORDS: organic fats, organic compounds, animals, vegetables, plants

INTRODUCTION
OIL:
Any greasy, viscous, flammable or non-flammable substance, liquid at room temperature and insoluble in water but soluble in organic compounds that is derived from plants, animals, or mineral deposit or manufactured artificially and use for food, lubricant or as fuel (Chambers 1996).

Various organic fats are essential constituents of plants and animals life. Every specie of plants and animals produce some quantity of fats and oil during its life cycle. However, only relatively few plants and animals fats and oil are produced in sufficient quantities to become an article of commerce. The most important oil therefore are those that can be obtained in commercial quantity from readily available raw materials (Roslla., 2011).

Sometimes, the terms ‘fat’ and ‘oil’ are used interchangeably , but more often, the term fat referred to those fatty materials that are solid at room temperature while oil are liquid under the same condition.

However, some oils such as coconut oil are quiet solid at room temperature. Unlike petroleum or other oil of minerals origin, all animals , vegetables and marine oils are triglyceride or esters of fatty acid, ie, they are chemical combination, of one molecule of glycerol with three molecules of fatty acids. When processes with caustic alkalis, which are salt of fatty acid and are glycerol which is a trihydric
alcohol (Kostianoy, et al., 2014).

The fatty acid portion of the triglyceride structure represent over 92% of the total weight, the balance consisting of the glycerol radical, such as cholesterol, phytosteroids, phosphatides (lecithin), vitamins and water. The total amount of triglyceride components present is usually not over 3% of the weight. Oil and fats has tendency to dry or solidify on exposure to air. The drying is caused by oxidation or chemical combination with oxygen rather than by evaporation of solvents. The rate of drying is measured by number known as iodine number (value). Oils classified as non-drying include coconut, butter, palm oil with iodine numbers from 9- 65. semi-drying oils include olive , peanut, com, cotton seed and sunflower with iodine number between 85-130. Drying oil includes fish oil etc. with iodine number varying from 150 and 200. (Americana Encyclopedia)

**OCCURRENCE AND COMPOSITION OF FAT AND OIL**

Biochemistry have found it convenient to define one set of bimolecular, the lipids, as substance insoluble in water, that can be extracted from cell by organic solvent at low pH Polarity like ether or chloroform. (Hooper., 2015)

This is a catch of all sort of definition, and lipids including compounds of different kinds. Steroids for example, and trepans of lipids. These compounds are not only important, indeed every compound in organism plays an important role, if only as an available waste product of metabolism, but they are most abundant.

Fats are main constituents of the storage fat cells in animals and plants, and are one of the important food reserves of living organism. We can extract animals and vegetable fat, liquid fat are often referred to as oil. Fats are carboxylic esters derived from the single alcohol, glycerol HOCH2CHOHCH2 and are known as glycosides, and they are triglycerol (Morison 1987) Fats and waxes belongs to group of natural occurring compounds called lipids (Greek - Lopose = fats) lipids are those constituents of plants/ animals which are soluble in organic solvents such as ether, chloroform, carbon tetrachloride, benzene, hexane but insoluble in water. Lipids which yield fatty acid and alcohol on hydrolysis with aqueous base (saponified) are referred to as simple lipids. These can further be divided as: Fats and oil which yields long chain fatty acids and glycerol upon hydrolysis. Acid waxes, which yields long chain fatty acid and long chain alcohols upon hydrolysis. Fats and oil are the most important lipids found in nature. They are one of the three major factors needed for human body, the other two, being protein and carbohydrates. Fats and oil are widely distributed in tissues, bones and around nervous tissues, kidney, heart and other organs of the body (Human protein, 2017).

**MATERIALS AND METHODS**

**MATERIALS USED:**

- Soxhlet extraction apparatus: beakers conical flask, heating mantle, water bath, titration apparatus, measuring cylinder, electric weighing balance, phenolphthalein indicator etc.

**SOURCE OF RAW MATERIAL**

The Guna seed was purchased from the main market of GA’ANDA Town of Gombi Local Government area, Adamawa state.

**SAMPLE PREPARATION:**

The Guna seed was manually cleaned, dried and kept in moderate temperature. The cleaned and well stored seed was well pounded using laboratory pestle and mortal.

**WEIGHING AND EXTRACTION OF THE OIL**

The modern way of processing vegetable oil is by chemical extraction using solvent extract which produce high yield and is quicker and economical. The solvent used is petroleum derived n-HEXANE and this techniques is use for the most of industrial oil such as soybeans and com oil.(Jif and Crisco, 2002).

Another way is the physical extraction which does not involve the use of a solvent extract. It is made the traditional way using different type of mechanical extraction. This method typically produces more traditional oil e.g olive oil which is preferred by most customers. Other methods of extraction of oil include expeller press, the screw press, Decoction method and the Ram Press.

For the purpose of this study, the soxhlet extractor was used. This is because it produces high yield and it is quicker and more economical. It is only limited to the extraction of lipids required where the desired compound has a limited solubility in a solvent and the impurity is soluble in the solvent (Cumpson and Sano, 2013).

**EXTRACTION OF OIL**

100ml extraction flask was weighed empty, and 100g of the grinded Guna seed was folded in a thick filter paper and inserted into an extraction thimble. It was placed in the soxhlet extractor, the flask was connected to n- hexane 60-80° C was filled into the extractor and the solvent siphoned over and over until it was colorless then the solvent was gently boiled under reflex. At the end, the solvent was evaporated by direct heating on water bath (69°C). Then, the flask containing the oil was even dried 30-40°C for at least 30 minutes. It was allowed to cool and was weighed to find its mass (Jensen, 2007).

**DETERMINATION OF PERCENTAGE OIL EXTRACTION**

Mass of sample = 100.0g, Mass of empty beaker = 86.0g, Mass of o flask + oil = 142.2
Mass of oil = ( Mass of flask + oil) - (mass of empty flask)
\[ \text{Volume of sodium thiosulphate for sample} = V_1 = 12.00 \text{ml} \]
\[ \text{Volume of sodium thiosulphate for blank} = V_1 = 7.80 \text{ml} \]
\[ \text{Polarity of sodium thiosulphate} = 0.1 \text{ m} \]
\[ \text{Volume of sodium thiosulphate for blank} = V_i = 12.00 \text{ml} \]
\[ \text{Volume of sodium thiosulphate for sample} = V_2 = 4.00 \text{ml} \]
\[ \text{Using the formula: iodine value} = \frac{(V_1-V_2) \times M \times W}{X} \]
\[ = \frac{(12.00 - 7.80) \times 0.1 \times 127 \times 100}{20} \]
\[ = 10.16 \]

**DETERMINATION OF FREE FATTY ACID (PERCENTAGE)**

Acid value is expressed as the percentage fatty acid calculated as oleic acid (A.O. AC 1990)

**METHOD AND MATERIALS**

2.00g of Guna seed oil was weighed into 250ml conical flask, 25ml 96% alcohol was added and 1 ml phenolphthalein was added (indicator) and was shaken.

The solution was titrated with 0.1M NaOH, with constant shaking until pink color was obtained, but the pink color disappeared in less than 20 seconds.

\[ \text{Acid value} = \frac{\text{titrative ml} \times 5.61 \text{ wt of FFA}}{\text{F.F.A}} \]

F.F.A is usually calculated as oleic acid (Mr. = 282g)

\[ \text{F.F.A} = \frac{\text{titrative ml} \times 0.1 \text{M NaOH}}{\text{F.F.A}} \times \text{oleic acid} \]

**DETERMINATION OF PEROXIDE VALUE**

Peroxide value is determined by subjecting potassium iodide at room temperature. Thus the liberated iodine is titrated with sodium thiosulphate.

**METHOD AND MATERIAL**

1.10g of Guna seed oil was weighed into 250ml conical flask, 25ml of solvent (n- Hexane), 1ml 15% KI solution was added and was allowed in the dark for a minute. 35ml of distilled water and 3ml of starch solution was added. The solution was titrated with 0.1M sodium thiosulphate. The same procedure was taken for the blank le without the amole.

The reading was taken for 3 times to obtain die average titre. Number of moles of sodium thiosulphate, \( N = 0 \) 1 weight of the oil used, \( w = 1.100 \) g volume of solution used for blank, \( V_1 = 7.80 \) volume of solution used for the sample, \( V_2 = 7.00 \) using the formula.

\[ \text{Peroxide value} = 100 \frac{(V_1 - V_2)N}{W} \]

\[ = 100 \frac{(7.80 - 7.00)}{0.1} \]
\[ = 100 \times 0.8 \times 0.1 \]
\[ = 7.27 \text{ mg/kg} \]
DETERMINATION OF PROTEIN IN GUNA SEED OIL:

100g of Guna oil was placed in a Kjedahl flask, 25cml Cone. H₂SO₄ 2.5ml 2m K₂SO₄ and 2m CuSO₄ was added. The flask was gently heated on a heating mantle in an incline position until the brown color disappeared. The flask was cooled and its content diluted with distilled water. The dilute solution was transferred into round bottom Bask and tilted with a condenser, the condenser depend in excess 10ml 0.2M H₂SO₄, the liquid heated and titrated. The excess acid was determined by titrating the liquid with 0.1M NaOH using phenolphthalein as indicator.

Titre value, 0.35ml = v Weight of sample used, w = 1.0g Using the formula

% Nitrogen = \( \frac{14 \times v \times N}{1000} \)

= \( \frac{1.4 \times 0.35 \times 0.2}{1.0} \)

= 0.098

The value 0.098 is multiplied by 6.25 to obtain the % protein. The value thus obtained was 61.0%

DETERMINATION OF MOISTURE CONTENT

2.00g of the oil was placed in a watch glass and oven dried for 31/2 hours. It was cooled in a desiccator and weighted the process continued until a constant weigh was obtained. The % moisture was calculated using the formula below:

Weight of sample used, w = 2.00g,

Weight of watch glass 54.40

Weight of watch glass + oil = 54.80 + 2.00 = 56.40

Weight after 1st drying = 56.20.

2nd drying = 56.10

3rd drying = 56.10.

Weight lost= 56.20 - 56.10 = 0.10

% moisture = \( \frac{weight\ loss \times 100}{weight\ of\ sample} \)

= \( \frac{0.10 \times 100}{2.0} \)

= 5.00

DETERMINATION OF CRUDE FIBRE

1.5 g of Guna seed oil was defected with diethyl ether for about 6 hrs. The residue was boiled under reflux with 200ml of 1.25% H₂SO₄. It was filtered by a cloth on a funnel. The residue was washed until not longer acidic the residue was boiled again under reflux with 200ml 1.25% NaOH solution. It was filtered with a piece of cloth on a funnel, it was washed with warm water in a crucible of known 54.80 g and was allowed to cool in a desiccator and weighed as the C₂ % crude fiber was calculated as:

% crude fiber = \( \frac{C₂}{W} \)

Weight of sample - w = 1.50g

Weight after 1st cooling = C₂ = 56.10

Weight 2nd cooling - C₃ 56.00

% crude fibre , = \( \frac{56.10-56.00 \times 100}{1.50} \)

= 6.67

DETERMINATION OF CRUDE FAT

1.5 g Gun a seed oil was placed in a fat extraction of 2 hours. It was set a place to the soxhlet apparatus and the fat extracted with petroleum ether for 3-4 hours. Extracted fat was dried on a heating mantle for about an hour. The flask was then cooled in a desiccator and weighed.

Weight of flask =86.00

The % fat was determined by the formula;

% fat = \( \frac{weight\ of\ flask + oil - weight\ of\ flask \times 100}{Weight\ of\ sample} \)

= \( \frac{86.18 - 86.00 \times 100}{1.50} \)

= 12.00

CARBOHYDRATE DETERMINATION

The percentage carbohydrate was determined by subtracting the known i.e. crude protein, crude fat, total ash, crude fibre and moisture content out of 100, the difference is the % carbohydrate.

I.e. % CHO = ( 100 - ( Protein + fat + ash + fibre + moisture) = 100 - ( 61.00 + 12 + 0.73 + 6.67 + 5.00) = 100 - 85.40 = 14.60

% carbohydrate was found to be 14.60%
CONCLUSION

In conclusion, guna seed (Citrillus Vulgaris) contains high amount/Percentage of oil compared to some seeds, it is found to have very low acid value and so it can hardly be saponified. It is a drying oil that can be used for industrial manufacture of cosmetics, margarine and can as well be used as a large and small scale industrial lubricant.

REFERENCE


Table 1

<table>
<thead>
<tr>
<th>S/N</th>
<th>CHARACTER</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saponification value</td>
<td>112mg/L</td>
</tr>
<tr>
<td>2</td>
<td>Iodine value</td>
<td>10.20</td>
</tr>
<tr>
<td>3</td>
<td>Acid value</td>
<td>0.112</td>
</tr>
<tr>
<td>4</td>
<td>Free fatty acid (%)</td>
<td>5.6</td>
</tr>
<tr>
<td>5</td>
<td>Peroxide value</td>
<td>7.27 mg/kg</td>
</tr>
<tr>
<td>6</td>
<td>Protein value (%)</td>
<td>61.00</td>
</tr>
<tr>
<td>7</td>
<td>Moisture content</td>
<td>5.00</td>
</tr>
<tr>
<td>8</td>
<td>Ash content</td>
<td>0.73</td>
</tr>
<tr>
<td>9</td>
<td>Crude fibre</td>
<td>6.67</td>
</tr>
<tr>
<td>10</td>
<td>Crude fat</td>
<td>12.00</td>
</tr>
<tr>
<td>11</td>
<td>Carbohydrate content</td>
<td>14.60</td>
</tr>
</tbody>
</table>

Table 1

Characterization of the Guna Seed Oil