

Comparison of three methods, utilizing different principles, for determination of Ascorbic acid from seeds of Baobab fruit.

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Abstract

The aim of this study is to determine concentration of Ascorbic acid (Vitamin C) in seeds of Baobab plant. The samples were collected from Elobeid city (Northern Kordofan) and Portsudan city (Red Sea State) market and experimental tests were done by three different methods, the titration with 2,6 dichlorophenol indo phenol, Iodine titration and spectrophotometer device. The result shown that concentration of the ascorbic acid by 2,6 dichlorophenol indophenol for Elobeid sample is 232 mg / 100 gm and for portsudan sample is 227.7 mg / 100 gm. And its concentration by spectrophotometer in Elobeid sample is 217.5 mg / 100 gm and portsudan is 205 mg / 100 gm, and by Iodine titration the concentration of Ascorbic acid for Elobeid sample is 187.6 mg / 100 gm and portsudan sample is 175 mg / 100 gm. The results indicter that titration method against 2,6 dichlorophenol indo phenol is the best method in this study for determination Ascorbic acid and Elobeid sample contained high concentration of Ascorbic acid to be used as antioxidant properties.

Keywords: Ascorbic acid; Extraction; Baobab Fruit; Chemical Analysis Method.

1. Introduction:

Ascorbic acid is a naturally occurring organic compound with antioxidant properties. It dissolves well in water to give mildly acidic solutions. Ascorbic acid is one form (vitamer) of vitamin C [1 – 4]. It was noted that baobab fruit pulp has very high vitamin C content (280–300 mg/100 g), which is seven to ten times more than oranges (51 mg /

100 g) [5 – 6].

Extraction techniques have been widely investigated to obtain such valuable natural compounds from plants for commercialization [7].

In this study used solvent of water for extraction. Extraction, according to the six principles of green extraction (Innovation by selection of varieties and use of renewable plant resources; Use

of alternative solvents and principally water or agro-solvents; Reduce energy consumption by energy recovery and using innovative technologies; Production of co-products instead of waste to include the bio- and agro-refining industry; Reduce unit operations and favour safe, robust and controlled processes; Aim for a non-denatured and biodegradable extract without contaminants) of natural products, is a new concept to meet the challenges of the 21st century, to protect both the environment and consumers, and in the meantime enhance competition of industries to be more ecologic, economic and innovative. The concept of the green extract is introduced—an extract obtained in such a way to have the lowest possible impact on the environment (less energy and solvent consumption, etc) [8].

The chemical analysis, whether the measurement is performed using classical (wet chemical) or instrumental methods, is to provide information in order to solve a problem or to make a decision. To obtain reliable results should consider more than the measurement,

which is only one component of a chemical analysis [9].

This study aimed to determine concentration of Ascorbic acid (Vitamin C) in seeds of Baobab plant.

2. Materials and Method:

2.1 Area of Study:

Baobab fruit samples were taken from two local market: At Elobeid city and Portsudan city.

2.2 Preparation of Samples:

All Samples collected undergone to cracking in order to separate seeds and fibers. Then it dried by oven dryer for 2h at 100 °C. After that it grinding by blender and csieved by a sieve with small spaces to separate small parts from fibers. Samples were kept in desiccator to be ready for tests.

2.3 Determination of Ascorbic Acid by 2, 6 dichlorophenol indophenol:

Determination of Ascorbic Acid by 2, 6 dichlorophenol indophenol, first: The preparation of standard Ascorbic Acid solution: Ascorbic Acid (crystalline powder), distilled water: 0.0529 gm: 100 ml. Then it added 1 ml (Glacial Acetic Acid 99%). Then it titrated against dye solution until. The scarlet red color pale.

Repeated these steps three times for taking average of dye solution volume against standard Ascorbic Acid solution (ST).

Second: The preparation of blank solution: Distilled water: Glacial Acetic Acid 99%: 1 ml: 5 ml. Then it added 1 ml (Glacial Acetic Acid 99%). Then it titrated against dye solution until end - point. Repeat this steps three times for taking average of dye solution volume against blank (BL).

Third: The preparation of sample solution: Sample: Dis. water: 1 gm: 250 ml. Then it filtered and diluted the filtered to 100 ml then taken 5 ml after filtered. After that it added 1 ml (Glacial Acetic Acid 99%). Then it titrated against dye solution until appeared red color. Repeat these steps three times for taking average of dye solution volume against sample (T). The concentration of Ascorbic Acid calculated by this equation:

$$\text{Concentration of Ascorbic acid} = \frac{(T-BL)}{(ST-BL)}$$

Where as

T = Dye solution volume against sample.

BL = Dye solution volume against blank.

ST = Dye solution volume against standard Ascorbic Acid solution.

2.4 Determination of Ascorbic Acid by Iodine:

Determination of Ascorbic Acid by Iodine, first: The preparation of standard Ascorbic Acid solution to titrated it against Iodine solution: Ascorbic Acid, distilled water: 0.59 gm: 100 ml. Then taken of it 25 ml to added 10 drops of starch indicator. Then it titrated against Iodine solution (Soluble 5 gm of Potassium Iodate (KI) in Dis. Water, after that it added 30 ml of Sulfuric Acid (H₂SO₄ 3M)) until appear blue color constant up to 20 seconds. Repeated these steps three times for taking average equivalent volume in Iodine solution, when standard Ascorbic Acid solution titrated by milliliter (V).

Second: The titration of sample against Iodine solution was done by taken 2 ml of sample solution with adding 10 drops of starch indicator until appeared blue color up to 20 seconds. Repeat these steps three times for taking average of equivalent volume in Iodine solution, when sample titrated by milliliter (Z). The Number gram of Ascorbic Acid in

taken sample calculated by this equation:

$$X = \frac{(Z * Y)}{V}$$

Where as:

X = Number gram of Ascorbic Acid in taken sample.

Z=Equivalent volume in Iodine solution, when sample titrated by milliliter.

Y = Number gram of Ascorbic Acid standard.

V = Equivalent volume in Iodine solution, when standard Ascorbic Acid solution titrated by milliliter.

Then the concentration of Ascorbic Acid in sample per 100 ml calculated by this equation:

$$\text{Concentration of Ascorbic acid mg / 100 ml} = \frac{(C * 50)}{L}$$

Where as:

C = Concentration of Ascorbic Acid in taken sample.

L = Volume of taken sample solution.

2.5 Determination Ascorbic Acid by UV Method:

Determination of Ascorbic Acid by using Spectrophotometer device and the concentration of Ascorbic Acid calculated by this equation:

$$\text{Concentration of Ascorbic acid mg / 100 ml} = \frac{A}{S}$$

Where as:

A = Absorbance.

S = Slope.

3. Results and discussion:

3.1 Concentration of Ascorbic Acid which determined by 2, 6 dichlorophenol indophenol:

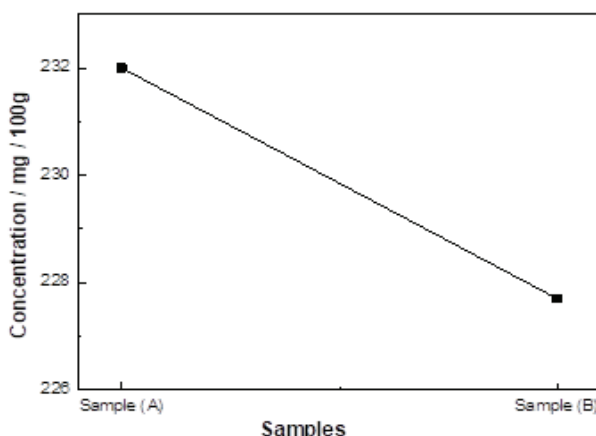


Fig.3.1: Concentration of Ascorbic Acid which determined by 2, 6 dichlorophenol indophenol.

The results shown that, the concentration of Ascorbic Acid in sample (A) i.e Elobeid sample, higher than sample (B) i.e Portsudan sample when determined

by: 2,6 dichlorophenol indo phenol, as in Fig.3.1.

3.2 Concentration of Ascorbic Acid which determined by Iodine:

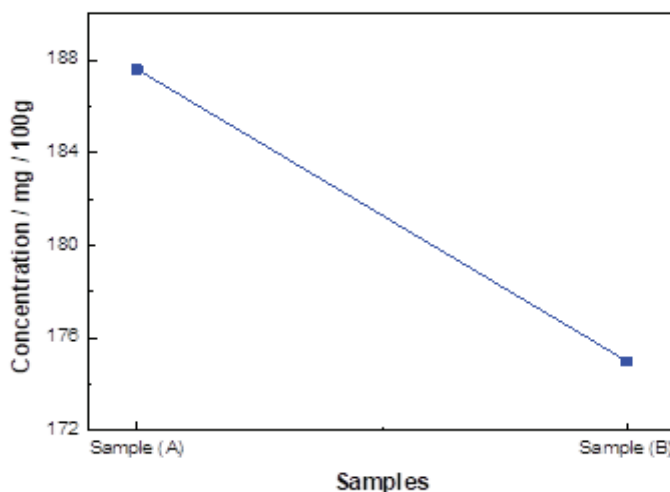


Fig.3.2: Concentration of Ascorbic Acid which determined by Iodine.

Also the concentration of Ascorbic Acid in sample (A) i.e Elobeid sample, higher than sample (B) i.e Portsudan sample

when determined by: Iodine, as in Fig.3.2.

3.3 Concentration of Ascorbic Acid which determined by UV Method:

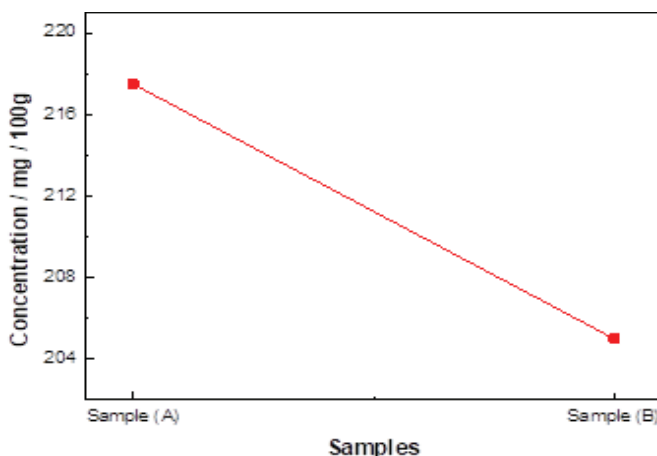


Fig.3.3: Concentration of Ascorbic Acid which determined by UV Method:

As well as, the concentration of Ascorbic Acid in sample (A) i.e Elobeid sample, higher than sample (B) i.e Portsudan sample when determined by: UV

Method, as in Fig.3.3. The Absorbance of standard Ascorbic Acid solution at 590 nm shown in Table 3.1.

Table 3.1: Absorbance of standard Ascorbic Acid solution at 590 nm:

Concentration mg / 100 gm	Absorbance
0	0
2	0.08
6	0.24
10	0.40
15	0.60
20	0.81
25	1.0

3.4 Comparison between methods utilized for Determination Ascorbic acid extracted from seeds of Baobab Fruit:

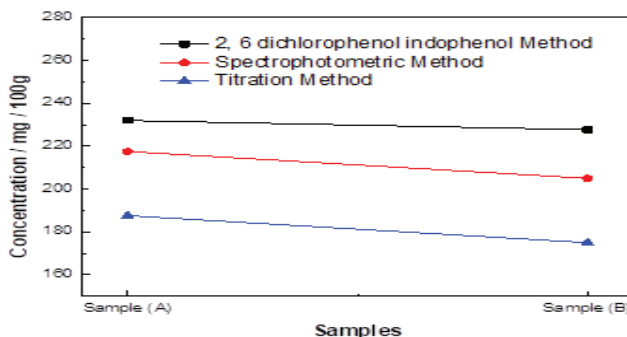


Fig.3.4: Comparison between methods utilized for Determination Ascorbic acid extracted from seeds of Baobab Fruit.

In this study all samples (A) i.e Elobeid sample, the concentration of Ascorbic Acid higher than samples (B) i.e Portsudan sample when determined by: 2,6 dichlorophenol indo phenol, Iodine

titration and UV method as in Fig.3.4, due that to period of stock in portsudan sample and the surrounding environment such as: Temperature and moisture has effect on Baobab fruit as well as on

concentration of Ascorbic Acid.

In standard the content percentage of Ascorbic Acid in Baobab fruit (150 – 499) mg / 100 gm, in this study the results indicate the concentration of Ascorbic Acid in the same range.

4. Conclusion:

The aim of this study is to determine concentration of Ascorbic acid (Vitamin C) in seeds of Baobab plant. The samples were collected from Elobeid city (Northern Kordofan) and Portsudan city (Red Sea State) market and experimental tests were done by three different methods, the titration with 2,6 dichlorophenol indo phenol, Iodine titration and UV method. The result shown that the concentration of Elobeid sample is 232 mg / 100 gm which determined by 2,6 dichlorophenol indophenol and in portsudan sample is 227.7 mg / 100 gm. In UV method the concentration of scorbic acid in Elobeid sample is 217.5 mg / 100 gm and portsudan is 205 mg / 100 gm by Iodine titration the concentration of Ascorbic acid for Elobeid sample is 187.6 mg / 100 gm and portsudan sample is 175 mg / 100 gm. The results indicate to titration

method against 2,6 dichlorophenol indo phenol is the best method in this study for determination Ascorbic acid and Elobeid sample contained high concentration of Ascorbic acid. We recommended that, continue study to find a good method for determination of ascorbic acid naturally, with antioxidant properties.

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