

Nutritional Composition and Fatty Acids Analysis of *Capparis decidua* L. Fruits

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Abstract: The aim of this study was to find out the nutritional value, fatty acids and mineral composition of fruits of *Capparis decidua* L. This has been carried out by analyzing chemical composition for samples of the plant collected from Goz Abu kelab, Algutaina Road, White Nile State, Sudan. The proximate analysis and fatty acids composition were determined by analyzing sample of identified plants using different methods. The results of analysis showed that the fruits of *C. decidua*. contain total ash ($6.34 \pm 0.06\%$), moisture ($5.18 \pm 0.01\%$), total oil percentage ($6.02 \pm 0.02\%$), crude fiber ($6.19 \pm 0.5\%$), crude protein ($14.32 \pm 0.2\%$), total carbohydrates ($61.95 \pm 0.03\%$) and total sugar ($0.42 \pm 0.1\%$). The fixed oil extracted from fruits were evaluated for chemical composition. The GC-FID analysis showed the presence of various saturated and unsaturated fatty acids such as Lauric acid (0.2080%) methyl ester, Tri decanoic acid methyl ester (0.3035%), Myristic acid methyl ester (0.5851%), palmitic acid methyl ester (46.0220%), Lamda-Linolenic acid methyl ester (0.6700%), Linolelaidic acid methyl ester (45.7910%), Cis- 11-Eicosenoic acid methyl ester (3.9941%), Arachidonic acid methyl ester (0.3080%), Erucic acid methyl ester (1.6876%) and Tricosanoic acid methyl ester (0.4307%). Fruits of *C. decidua* contained iron (81.8 mg/100g), sodium (26.9 mg/100g), potassium (2969.6 mg/100g), calcium (14.1 mg/100g) and manganese was not detected but it might been found in trace undetectable amounts. Generally, proximate compositions revealed that *C. decidua* fruits have better nutritional value as food and livestock feedstuff.

Keywords: *Capparis decidua* Fruits, Proximate Analysis, Fatty Acids, Mineral Composition

1. Introduction

Capparis decidua L.(Tundub) is belonging to family Capparaceae, yet important medicinal plant of Sudan. It belongs to *Capparis* species a dominating genus of the family Capparaceae. The plant and its parts are widely used by traditional healers and tribal people for curing variety of ailments. The medicinal uses of *C. decidua* are also mentioned in ancient books. The tree is typical of deserts and semi-deserts of northern and central Sudan, especially on sandy soils and in low rainfall savanna on clays spreading to the borders of Republic of Southern Sudan, sometimes mixed with *Acacia seyal* or *Balanites aegyptiaca* [1].

Human body requires various macro and micro nutrients such as protein, carbohydrate, fat or lipid as macro nutrients and vitamins, minerals, water and fiber as micronutrients. Likewise, human beings require a number of complex organic compounds as added caloric requirements to meet the need for

their muscular activities [2]. Plant materials form a major portion of the diet, their nutritive value is important. Thus, in the present study, the nutritional and medicinal segment of *Capparis decidua* fruits were investigated. In relevance to this matter, a general view on the importance of various chemical compositions of fruit is given hereunder [3].



Figure 1. *Capparis decidua* Fruits.

2. Materials and Methods

The fruits of *C. decidua* were collected from Goz Abu kelab, Algutaina Road, White Nile State, Sudan. The collected materials were authenticated and specimens were deposited in the herbarium of the Department of Botany, Faculty of Science, University of Khartoum.

2.1. Proximate Analysis of Plant Samples

The proximate analysis of the powdered plant samples for dry matter, ash, fat, protein and fiber was determined using the methods described in AOAC [4].

2.2. Preparation of Methyl Ester

The methyl ester was prepared according to method described by Christie [5].

2.3. Fatty Acids Composition by Gas – Chromatography (GC)

The fatty acid composition of the petroleum ether extract of *C. decidua* fruits was determined by GC. FID. Fatty acids was converted to their corresponding methyl esters (methylation) according to method described by Christie [5].

2.4. Mineral Analysis

The mineral content of *C. decidua* fruits was determined following the method of Ajayi [6]. Potassium and sodium were determined using flame photometer, while calcium, iron and manganese were determined using atomic absorption spectrophotometer as described the methods of the Association of Official Analytical Chemists [7] after appropriate digestion by acids.

3. Results and Discussion

The results of the determination of the proximate analysis of nutritional value, fatty acids and mineral composition of *C. decidua* fruits were presented in Tables 1, 2 and 3 respectively.

3.1. Proximate Analysis and Nutritional Value of *Capparis decidua* Fruits

This study was carried out to determine the nutritive value of the fruits of *C. decidua*, using standard procedures. The proximate composition of fruit was determined and presented in Table 1. The caloric value of the organic constituents was calculated from ash content, moisture content, oil, fiber, crude protein, carbohydrates, and total sugar. The total ash value of *C. decidua* fruits was $6.34 \pm 0.06\%$, this implies that plants have normal complexes of inorganic and organic compounds [8] such as ash content of fruit of *C. decidua* from different regions of Punjab (Pakistan) were determined on the dried weight basis and the results reported between (3.9 - 5.40%) [9].

The moisture content of *C. decidua* fruits was $5.18 \pm 0.01\%$, the result of moisture content was not high indicates less chances of microbial degradation of the drug during storage because excess moisture can result in the breakdown of important constituents by enzymatic activity and as a result may encourage the growth of yeast and fungi during storage [10]. The moisture content of *C. decidua* fruits from three different regions of Punjab, Pakistan ranged from 55.40 to 70.31% [9], in other research the moisture content in ripened fruit dried was reported 69.66% [11]. When compared, we found the results quite different, this is due to the fact that this plant in Sudan grows in semi desert areas, therefore, the humidity is very low. The value of crude fiber in the fruit of *C. decidua* was found to be $6.19 \pm 0.5\%$, in related study the fiber value was found 1% [12], the value ranged from 16.27-19.41% [9]. These differences in result might be attributed to different areas that collected from.

The amount of crude protein in fruits of *C. decidua* was $14.32 \pm 0.2\%$. The results were slightly similar and supported the finding of Kumar and Sharma who reported 14.94% [11], and lower than other results obtained 24.06% - 33.90% [9]. The results obtained showed that dry powder of fruit had high carbohydrate content, carbohydrates are one of the most important components in many food materials. Some carbohydrates are digestible by human and therefore provide an important source of energy. Carbohydrates also contribute to the sweetness, appearance and textural characteristics of many foods [13]. The result is very close to that obtained by Mishra (71%) [12].

Table 1. Proximate analysis and nutritional data of *Capparis decidua* fruits.

Test	Ash	Moisture	Oil	Fiber	Protein	Carbohydrate	Total Sugar
Percentage%	6.34 ± 0.06	5.18 ± 0.01	6.02 ± 0.02	6.19 ± 0.5	14.32 ± 0.2	61.95 ± 0.03	0.42 ± 0.1

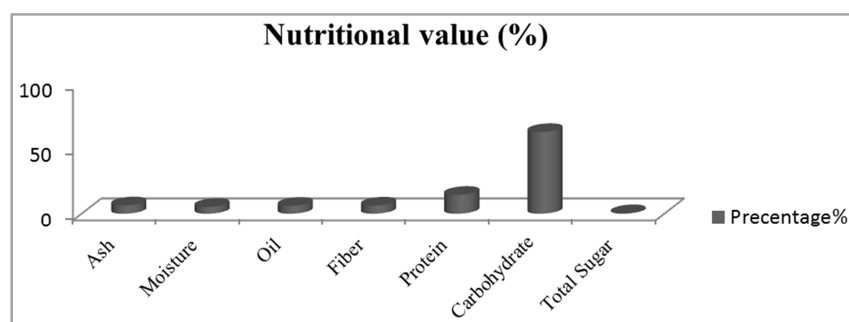


Figure 2. Proximate analysis and nutritional value of *Capparis decidua* fruits.

3.2. Fatty Acids Composition of *Capparis decidua* L. Fruits

According to the data presented in Table 2 of fatty acids composition of *C. decidua* fruits, Palmitic acid and Linoleic acid showed the highest concentrations (46.0220 and 45.7910% respectively) but, Lauric acid showed the least value (0.2080%). The concentration of other compounds namely Tridecanoic acid, Myristic acid, Linolenic, Cis-11-Eicosenoic, Arachidonic acid, Erucic acid and Tricosanoic acid were 0.3035, 0.5851, 0.6700, 3.9941, 0.3080, 1.6876 and 0.4307% respectively. The percentage of Linoleic acid and Arachidonic acid are similar with the data reported by Zia Ullah (47.33% and 0.78% respectively) [14].

Table 2. Fatty acids Composition of *Capparis decidua* fruits by gas chromatography (GC-FID).

Compound name	Fatty acid percentage%
Lauric acid methyl ester	0.2080
Tri decanoic acid methyl ester	0.3035
Myristic acid methyl ester	0.5851
Palmitic acid methyl ester	46.0220
Linolenic acid methyl ester	0.6700
Linoleic acid methyl ester	45.7910
Cis-11-Eicosenoic methyl ester	3.9941
Arachidonic acid methyl ester	0.3080
Erucic acid methyl ester	1.6876
Tricosanoic acid methyl ester	0.4307
	100.0000

3.3. Determination of Minerals Content of *Capparis decidua* Fruits

Minerals are required for normal growth, activities of

Table 3. Minerals analysis of *Capparis decidua* L. fruits.

Element	Iron (Fe)	Sodium (Na)	Potassium (K)	Calcium (Ca)	Manganese (Mn)
Mass mg/100g	81.8	26.9	2969.6	14.1	Not detected

4. Conclusion

The compositional studies indicated that *Capparis decidua* fruits is rich source of the major food components, and source of nutrients that are needed for proper growth both in adults and children. The data obtained reveal also that *C. decidua* fruit is a rich source of important electrolytic minerals like potassium which plays a vital role in maintaining the body fluidic balance and blood pressure control. The nutritional potency of this plant might be used to encourage local people to take care for the wild plants resources. Furthermore, this work will contribute to maintain the biodiversity and to promote the sustainable development and exploitation of the underutilized wild edible plants in Sudan.

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muscles and skeletal development (such as calcium), cellular activity and oxygen transport (iron). *C. decidua* fruits rich of iron, and it is useful in prevention of anemia and other related diseases [15]. Chemical reaction in the body and intestinal absorption, fluid balance and nerve transmission (sodium and potassium). Manganese plays a role in energy production and in supporting the immune system [16]. Deficiency of these nutrients and minerals are known to affect the performance and health in both humans and livestock [17].

The inorganic constituents using standard procedures, the mineral contents of the *C. decidua* fruits were determined and presented in Table 3. *C. decidua* fruits contained iron (81.8 mg/100g), sodium (26.9 mg/100g), potassium (2969.6 mg/100g), calcium (14.1 mg/100g) and manganese was not detected and might be present in trace undetectable amounts. In comparison the result was higher than those results obtained by Iqbal [9] where the *C. decidua* fruits contained (iron 12-17 mg/100g and potassium 140-480 mg/100g) but lower than other elements (sodium 60-150 mg/100g and calcium 15-21 mg/100g). Manganese was found 0.1-0.12 mg/100g [9] and this result supports that manganese was found in small amount in plant.

The plant parts are used as an appetizer, aphrodisiac, carminative, emmenagogue, tonic and to treat asthma, anorexia, cough, diabetes, jaundice, joint pain, parasitic worms, rheumatism and wounds. Pickled fruits are taken to relieve constipation and stomach ailments. [18]

The results obtained support some of the traditional uses of *C. decidua* and may offer potential leads to new active natural products [19].

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