

## NUTRITIONAL AND MEDICINAL IMPORTANCE OF ROSELLE CALYCES

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### Introduction

Roselle (*Hibiscus sabdariffa*) is a useful plant with different parts utilized in several ways. The useful parts include leaves and tender shoots, stems, calyces, and seeds. They are sources of anthocyanins, flavonoids, polyphenols, organic acids, and fiber which are single-stand products, and beverages and medicinal products are obtained from them. Some products of Roselle include sauces, vegetable salads, fruit salads, creams, perfumes, marmalade, seasoning products, fibers, spices, sauces, and vegetable oils. Roselle is widely used for the treatment of diseases. Afolabi used the aqueous methanol extract of Roselle and reported that the extract contained cardiac glycosides, flavonoids, saponins and alkaloids. It exhibited antibacterial activities against *Staphylococcus aureus*, *Bacillus stearothermophilus*, *Micrococcus luteus*, *Serratia marcescens*, *Clostridium sporogenes*, *Escherichia coli*, *Klebsiella pneumoniae*, *Bacillus cereus*, *Pseudomonas fluorescens*.

Many parts of Roselle including seeds, leaves, fruits and roots are used in various foods. Among them, the fleshy red calyces are the most popular. They are used fresh for making wine, juice, jam, jelly, syrup, gelatin, pudding, cakes, ice cream and flavors and also dried and brewed into tea, spice, and used for butter, pies, sauces, tarts, and other desserts. The calyces possess pectin that makes a firm jelly. The young leaves and tender stems of Roselle (fig 1) are eaten raw in salads or cooked as greens alone or in combination with other vegetables and/or with meat. They are also added to curries as seasoning. They have an acid, rhubarb-like flavor. The seeds, are high in protein, can be roasted and ground into a powder then used in soups and sauces. The roasted seeds can be used as a coffee substitute.



Fig 1. Roselle calyces (Source: <https://bionutriciaextract.com/blog-roselle-hibiscus>)

### **Nutritional composition of calyces**

Several workers have studied general composition of *Hibiscus sabdariffa* after harvest in number of varieties of local importance. Choi, S. w.*et al.*, (2000) studied the chemical and mineral composition of Roselle calyces (green, red, and dark red) and their observations are tabulated in Table 1 below.

**Table 1: Composition of Roselle calyces**

<b>Parameter</b>	<b>Calyces types</b>		
	<b>Green</b>	<b>Red</b>	<b>Dark red</b>
Moisture (%)	88.3	86.5	85.3
Crude protein (%)	17.9	17.4	8.6
Crude fiber (%)	11.2	8.5	9.8
Ash (%)	6.6	6.5	6.8
Ascorbic acid (mg %)	86.5	63.5	54.8
Ether extract (%)	3.2	2.1	2.9

**Table 2: Mineral composition of Roselle calyces**

<b>Mineral (mg %)</b>	<b>Calyces types</b>		
	<b>Green</b>	<b>Red</b>	<b>Dark red</b>
Calcium	1209	1583	1602
Magnesium	235	316	340
Potassium	1850	2060	2320
Sodium	9.5	5.5	6.5
Iron	32.8	37.8	34.6
Zinc	5.8	6.5	6.3

Roselle calyces and reported that the yellow variety had higher protein (9.08%) and ascorbate (56.83 mg %) than the red variety. The calyces had traces of tannin, phytates and cyanides. Both these varieties are promising

sources of iron (800.67-833.00 mg %) and  $\beta$ -carotene (281.28-285.28 RE/100gm).

Phytochemicals constituents and reported the presence of pectin, a known protestant and adsorbent (Da-Costa-Rocha, I. *et al.*, 2014). The phosphorus (0.052%), manganese and aluminium content in traces. The principal water soluble acid in calyces is citric acid (3.74%) and d - malic acid, tartaric acid, hibiscus acid in traces. The calyces also contain appreciable quantity of mucilage, calcium citrate and ascorbic acid. They also reported the presence of reducing sugars (0.82%) and sucrose (0.24%). The calyces also contain gossypetin and Hibiscin chloride (C<sub>26</sub>H<sub>29</sub>O<sub>16</sub>Cl.3H<sub>2</sub>O; melting point 178°C); the latter on hydrolysis yield glucose, pentose and delphinidinchloride. Hibiscin chloride is reported to possess antiseptic propertie (Duke, A. J.*et al.*, 2003).

## **Medicinal importance of Roselle calyces**

Roselle, also known as sorrel, Jamaica flower, and karkade, has been used by people for preparing soft drinks and in traditional medicine. It has been observed that its components, such as vitamins (C and E), polyphenols acids and flavonoids, mainly anthocyanins, have functional properties. Today, several studies have shown that compounds found in aqueous and ethanol.

According to Fullerton, M. *et al.*, (2011) Roselle calyxes' extracts may have antioxidant properties. These compounds could work in several ways in humans; for instance, they could have anticancer characteristics. They may also reduce chronic diseases such as diabetes mellitus, dyslipidemias, hypertension, and cardiovascular diseases (CVD). Some of these compounds (flavonoids and anthocyanins) are natural, which have no toxic or mutagenic effects.

It is reported to be antihypertensive, antiseptic, sedative, diuretic, digestive, purgative, emollient, demulcent, and astringent. The calyces are used to treat heart ailments, hypertension, and leukemia. They are also reported to have diuretic, aphrodisiac, antiseptic, astringent, cholagogue, sedative, laxative, and antimicrobial activity (Falade, O. S.*et al.*, 2005).



According to Gurrola-Daiz, C. M. *et al.*, (2010) the blending of Roselle juice with tropical fruit juices is anticipated to give products with high nutritional value and functional activity. The calyx of *Hibiscus sabdariffa* is widely used by humans like food, jams, jellies, juice drinks, wine, and as medicinal syrups (Naturland *e. et al.*, 2004). It is used effectively in folk medicines for the treatment of hypertension, inflammatory diseases, and cancer (Lin. *et al.*, 2007). The calyces are used to decrease blood viscosity and reduce hypertension (Houy, D. *et al.*, 2005). Hibiscus pigments reduce the incidence of liver lesions, including inflammation, leukocyte infiltration, and necrosis (Hassan Mozaffari-Khosravi, *et al.*, 2009). Also potent effects in the reduction of urinary concentrations of creatinine uric acid, citrate, tartrate, calcium, sodium, potassium, and phosphate have been demonstrated (Herrera- Arrellano, A. *et al.*, 2007).

## Conclusion

Many medicinal applications of the roselle plant have been developed around the world. Roselle is used to treat hypertension, pyrexia, and liver damage, and in ayurvedic medicine, it has been reported that the aqueous extract of *H. sabdariffa* L. attenuates hypertension and reverses cardiac hypertrophy (Odigie, *et al.*, 2003). The calyx extract has been used as an effective treatment against leukemia owing to its high content of polyphenols, particularly protocatechuic acid (Tseng, *et al.*, 2000). Roselle seeds, which until now have not had any commercial applications, are a source of a vegetable oil that is low in cholesterol and rich in other phytosterols and tocopherols, particularly  $\beta$ -sitosterol and  $\gamma$ -tocopherol.

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