

ROSELLE (*HIBISCUS SABDARIFFA* L.) A MULTIPURPOSE MEDICINAL PLANT AND ITS USES: A REVIEW

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ABSTRACT

Roselle (*Hibiscus sabdariffa* L.) is an important multipurpose plant, with many health promoting properties. It is propagated from its parts i.e., stem, leaves, seeds and roots. Dried calyces are commercially available and concentrated extracts usually used in the food and pharmaceutical companies. The roselle is known as functional foods and provides health benefits to consumers. Due to caffeine free, demand is increasing day to day for the products of this plant. Therefore, more companies are involved to develop of new value-added products. This review article aims to present important aspects of this plant and as well as its uses in food products, beverages and health benefits. It contains organic compounds and a drug use in the preparation of natural medicines. Roselle is a new introduction in our coastal area and need further studies for propagation, cultivation, production and protection.

KEYWORDS: Roselle, Fiber, Calyces, Food, Health and Medicinal.

INTRODUCTION

In Pakistan, many people rely on herbals and use the medicinal plants for the treatment of minor and major diseases. However, some plants are now being commonly explored for many types of active ingredients (Shinwari, 2010).

Roselle is an important species of family Malvaceae (Hutchinson and Dalziel, 1958; Heywood, 1978; Olubukola and Iloh, 1996). English name as roselle, Jamaican sorrel, red sorrel, Indian sorrel, rozelle hemp in urdulalambari and lal-ambariin Hindi (Morton, 1987). Roselle is an annual plant; erect standing, bushy, herbaceous subshrub canopy, 2-4m tall with smooth or nearly smooth, cylindrical and with typical red stems. Flowers singly beard in the leaf axil, yellow with rosy eyes. Calyces are typically red consisting of 5 large sepals with epicalyx of 8-12 slim, pointed bracts around the base which begin to enlarge and become fleshy and juicy. The capsule is green when immature and with light-brown colour seeds at maturity. The capsule turns brown and splits open when mature and dry. The calyx stems and leaves are acidic (Morton, 1987). Some parts also prescribed in traditional medicine in many countries (Da-Costa-Rocha *et al.*, 2014). Leaves are used as vegetables are antiseptic and digestive (Obouayeba *et al.*, 2014).

The Roselle calyces also used against liver disorders, hypertension, digestive and sedative (Wang *et al.*, 2000, Voon *et al.*, 2012, Ewansiha, 2014). The redcalyces were found in the calyx also rich in polyphenolic compounds such as phenolic acids such as protocatechuic and gallic acid and flavonoids (Higginbotham *et al.*, 2014). The dried calyces are commercially available and appreciated to obtain concentrated extracts which might be used in the food and pharmaceutical industries (Cid-Ortega and Guerrero-Beltrán, 2015). In traditional medicine, seeds are not much explored as compared to the other parts of this plant. However, roasted seeds consumed as food and also used traditionally as laxative, tonic, debility and diuretic (Ismail *et al.*, 2008). The root is used as an appetizer and tonic. The fibrous parts are used in the production of twine and cords known as rosella hemp. Folk medicine is still reliable source of the treatment of many diseases and healthcare system in many African countries. Moreover, these popular folk medicines have roots from Islamic and West African medicine (WHO, 2001). As in our knowledge; there is hardly any evidence in literature that any research work initiated in any institute of Pakistan on any aspect of this important plant.

Economic importance and usages: Roselle is used multipurpose in different forms such as leaves, stems, flowers (calyces) and fleshy fruits. Seed and fiber are important sources of raw food materials for foreign exchange (Schippers, 2000; Galaudu, 2006). Some chemical components are also extracted from dry calyces and used in various experiments and treatments. The Seeds are used as feed meal for fish and domestic animals. The edible oil is used as substitute to castor oil and used in soup or cakes. The seed oil is antihypertensive properties and used in beverages, folk medicine and pharmaceutical industries (Futules *et al.*, 2010).

The Roselle flowers are used in tea processing such as raw specialty health tea, fresh type and organic tea. The moisture content 15% max and extract content 41% min. In chemical composition, vitamins C (ascorbic acid) 80–100mg/100gm, protein content 5% max. Ash and mineral salts 7% max impurities 2% max Natural pigment > 1.5 mg/100g reducing sugar 12% max. Total acids 25–30% and fiber 15% min.

Roselle plant has been used in many countries for lot of medicinal applications. In China, it is also used against pyrexia, hypertension and liver damage (Duke, 1983). Leukemia is effectively treated with sepal extract due to its high polyphenols content (Tseng *et al.*, 2000). Roselle seed contains oil that is rich in phytosterols and tocopherols. It is low in cholesterol.

Table 1. Nutritional information from different parts of Rosell (*Hibiscus sabdariffa* L.).

Nutrients	Flowers (100g)	Red calyces (100g)	Green calyces (100g)	Seed (100g)
Ash (g)	9.75±0.59	12.24	6.83	6.89
Fat (g)	0.59±0.06	2.01	2.17	21.60
Crude Fiber (g)	33.9±3.59	4.69	6.75	4.12
Protein (g)	9.87±0.28	4.71	6.45	31.02
Moisture (g)	4.38±0.05	9.25	-	-
Carbohydrate (g)	4.38 ±0.05	68.75	71.56	36.37
Sodium (mg)	ND	96.66	48.1	ND
Potassium (mg)	ND	49.35	49.59	ND
Calcium (mg)	ND	12.65	21.58	6.6
Magnesium (mg)	ND	38.65	47.54	ND
Iron (mg)	ND	3.22	3.37	ND
Zinc (mg)	ND	12.22	16.28	ND
Manganese (mg))	ND	2.39	5.61	ND
Nickel (mg)	ND	1.78	3.57	ND
Phosphorus (mg)	ND	36.30	15.05	6.8
Ascorbic acid (mg)	ND	16.67	12.50	ND

Sources: Sayago-ayerdi *et al.* (2007), Hainida *et al.* (2007), Adanlawo and Ajibade (2006). ND: Non Determinate

Sudan produces best quality of Roselle in the world but in low quantity. Other countries like Egypt, Mexico, Senegal, Mali, Tanzania and Jamaica are also suppliers but products are domestically used (Mohammed *et al.*, 2011). Thailand has more invested in Roselle production and also products from this country are superior quality, but China brand with less stringent quality control practices. Tsai and Ou (1996) reported that Roselle is mostly used in the production of wine, syrup, jelly, jam, juice, gelatin, pudding, cake, ice cream and flavoring. It is unique in flavor and brilliant red color makes it a valuable food product. Mohammed *et al.* (2011) reported that this plant used as animal feed. The calyx juice is claimed to be a health-enhancing drink containing anthocyanins and other antioxidants. The dried calyces are used as sauces, ices, ice cream, jelly, tea, marmalade, sorbets, butter, pies, tarts and other desserts (Duke and Ayensu, 1985). Flowers widely used as sweet herbal tea and seeds as an aphrodisiac coffee substitute.

An assessment by Hellen Omondi, (2014) reports that the Roselle is multipurpose crop which can provide food and cash income as a vegetable and processing of domestic and industrial products. Dried calyces have high market potential for both export and local markets. Daily demand for this plant product is raising interest as caffeine free like Roselle tea as natural herbal product. Currently, Malaysia supplies much of the Roselle raw material globally. In Kenya the herbal tea and beverage are sold in the super markets and other shops with specialized herbal products.

According to Reddy *et al.* (2015) this plant is cultivated as vegetable in India. Tea from this plant is also used against high blood pressure. Wilson and Menzel (1964) reported that extractions of Roselle have been used medicinally to treat colds, toothaches, urinary tract infections. Odigie *et al.* (2003) reported that the juice from Roselle leaves has been used to treat conjunctivitis. Roselle leaves have also been applied as a poultice to treat sores and ulcers, besides being used as an antiscorbutic for the treatment of scurvy, a refrigerant to relieve fevers, an emollient, a diuretic, and a sedative in Senegal. Roselle leaves are useful for the treatment of scurvy.

Therapeutic Research Centre (2009) studied that in Egypt, flower of roselle are used for a popular drink known as Karkade. It is also used against cold, heartand upper respiratory tract pain, nerve diseases, loss of appetite, swelling (inflammation), stomach irritation, fluid retention, disorders of circulation; for dissolving phlegm; gentle laxative and diuretic to increase urine output.

Panizza (1997) reported that some parts of the roselle are also used against heart diseases, fevers, coughs, biliary problems, abscesses, hangovers, hypertension and neurosis. Seed as a food supplement utilized against anemia and leaves powder served as nutrient-enriched flour. The studies also showed that carbohydrates, potassium oxalate, pigments, glycosides, mucilages, flavonoids (hibiscine and hibiscetine) and anticyanic derivatives (gossipetine and glycoside) which play an important role in decreasing blood viscosity, reducing pressure and stimulating digestion are present. The leaves contain vitamin C, iron, calcium and carotenes (Leclerc, 1938; Teske and Trentini, 1995).Calyx juice was reported as a folk remedy for cancer and no any bacterial isolate reported from it (El-Sherif and Sarwat, 2007).

McClintock and Tahir (2004) concluded that the Roselle leaves are used as a source of mucilage in pharmacy and cosmetic industry. The roots decoction of Roselle has also been used for a similar application (Gallaher *et al.*, 2006). Alarcón-Alonso *et al.* (2012) reported that the ethno botanical information of Roselle plant revealed diuretic, diaphoretic, uricosuric, antibacterial, antifungal agent, mild laxative, sedative, antihypertensive, antitussive, gastrointestinal disorder

treatment, hypercholesterolemia treatment, kidney stone treatment, liver damage treatment, agent for decreasing the viscosity of the blood, and agent for treating the after effects of drunkenness. Roselle is consumed as hot and cold drinks, the drinks are widely used as diuretic, for treating gastrointestinal disorders, liver diseases, fever, hypercholesterolemia and hypertension (Ojeda *et al.*, 2010). According to Khalid *et al.* (2012) ripe calyces are used for hot and cold beverages and medicinally it is used as antispasmodic, hypotensive and antimicrobial agent and for relaxation of the uterine muscle. Eslaminejad and Zakaria, (2011) reported that Malaysians used Roselle as a popular health drink. Wahabi *et al.* (2010) also reported that anthocyanins and proanthocyanidins compounds of the Roselle calyces contained bioactive compounds which are responsible for lowering the blood pressure.

The finding in his review work has brought to light some important multi uses of Roselle in traditionally, folk medicine and other multipurpose uses. According to the medical potential, health, food and fiberuses of this plant, it is also suggested for introduction and further cultivation of Roselle in coastal area of Pakistan.

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