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## Chapter

# A Review In Medical, Pharmacological and Industrial Importance of Roselle *Hibiscus sabdariffa* L.

*Ali S. Hassoon, Ahmed A. Kadhim and Madeha H. Hussein*

## Abstract

Medicinal plants and plants occupy a major place in the world's agricultural and industrial production as the main source of pharmaceutical drugs or as a source of active substances that are used in the preparation of medicine. The Roselle plant *Hibiscus sabdariffa* L. (Malvaceae Family) is known in Arabic as "karkade" and "Roselle". The continental regions of Africa and Asia are the original home of the Roselle. The months of March and April and proceeds to reap the fruits during the months of October to the end of December. Recent researches and studies have pointed to the use of Roselle plant in the medical, food and industrial fields. It is used in the manufacture of jellies and jams. The syrup is added to some medical preparations. It is refreshing, moisturizing, and helps digestion. It is also a useful drink in the cases of bile. It causes urination and acts as an antifungal agent. and is used in the treatment of high blood pressure, It is also used in cancer treatment.

**Keywords:** rosella, medicinally plants, pharmacological uses

## 1. Introduction

The current interest is in the exploitation of the active substances of some pharmaceutical plants and their manufacture as important medical drugs for the treatment of many diseases and for the prevention, treatment and pain relief, and therefore these plants have taken a great deal of attention and studies as the main source of these drugs and the manufacture of safe medicines [1]. It has been used in many countries of the world to treat various viral and microbial diseases because they are more useful in different treatment stages and are safer and less expensive compared to laboratory-based chemical treatments [2].

*Hibiscus sabdariffa* L., which belongs to the Malvaceae family, is a medically important plant [3]. Its medicinal significance is concentrated in its leaves, which are a source of Hibiscus, which has a medical effect. Its leaves are rich in vitamin C, citric, Tartaric, It also contains Protocatechuic Acid (PCA), an important antioxidant as well as its role in the treatment of certain cancers [4].

It is used as a refreshing beverage for the purpose of tempering the high temperatures and uses the red dye produced artificially as food nutritious natural food, and also enters the manufacture of jams, ice, candy, and food preservation, and the seeds contain a high proportion of oil up to the limit of 20–25% 30–35% protein [5].

## 2. Plant classification and naming

*Hibiscus sabdariffa* L. belongs to the Malvaceae family of Malvales, a Sabdariffa species of Hibiscus, a plant covered with Angiosperms dicotyledons seeds [6].

The origin of the name of the Rosella comes back to the area of Gujarat in India, and it is known by many names that differ from one region to another. The common name in Iraq is al-Gujarat tea. It is also called kaajah, red acid, kardipip, and gypsy. In Arab countries, it is called Karkade. In Brazil, it is called “Rosela” and is called commercially in America (Hibiscus). In England, it is called rozelle, sorrel, sour. In France, it is called “Bissap” and “Jamaica”. In North and East Africa it is called “karkade or carcade” Senegal (bissap) and Nigeria (serrol) and in Iran is known as (Chaye -Torosh) [7, 8].

## 3. Plant description

Agglutaceous leafy plant with roots, spines, and legs, cylindrical with a smooth texture and greenish-red color, up to more than two meters depending on the variety. The leaves are simple, reciprocal, hand-shaped, finely edged, greenish-red, long-necked and long-necked. The leaves are white, yellow or red, consisting of five large, thick, succulent, thick leaves. The fruits are capsules containing a large number of kidney seeds. The texture is dark brown (Figure 1) [9, 10].



**Figure 1.**  
*Cultivation of rosella in my field of research.*

#### 4. Origin home and the appropriate environment

The original locality of the Gujarat plant is not yet clearly known, as it is believed that the tropical and subtropical regions of Africa are the original home of the Gujarat and others believe that India is its original home [11], That the Arab homeland is the original home of the Quraysh.

In the Arabian world, the cultivars are widely cultivated in semi-tropical regions of China, Malaysia, India, Indonesia, the Philippines, Vietnam, Nigeria, and Mexico. In the Arab world, they are grown in Saudi Arabia, Egypt, and Sudan [12]. Al-Qadisiyah Governorate, south of Iraq, especially in the Sunni area. It was cultivated as a summer crop in the southern and central regions. It was used as a refreshing drink and as a treatment for many diseases.

Cultivars are grown in most types of soils. However, they are grown in soft and fertile soil. They can withstand heavy soil conditions. The plant needs 4 to 8 months to complete its phytoplankton growth. The plant does not tolerate temperatures below 20° C during its growing stage. In areas where the temperature range is 28–35° C and air humidity is not more than 65% during the vegetative and syphilis stages, it is a long day plant. It requires about 13 hours of lighting per day to push the plant to bloom [13].

High humidity and high rainfall play a negative role during the harvest period. Drought conditions lead to a decrease in yield and a decrease in quality and quality of leaves. The plant needs about 130–200 mm of monthly rainfall rate during the first months of growth. The vegetative effect of the grits on the quality of the seeds, the prevailing environmental conditions, the date of harvest and post-harvest treatments, especially drying (**Figure 2**) [14].

#### 5. Plant content of chemicals and effective compounds

Hibiscus species are different in their percentage of active food and chemical content depending on their genetic differences. Effective chemicals spread throughout the plant, which gives it high medical and pharmaceutical importance. It is a rich source of 25–35% protein, The most important of which are lysine, alkaline, and leucine [15].



**Figure 2.**  
*Roselle varieties (red, white and lined) in my research field.*

It is also rich in calories. Each 100 g of calyxes contains 49 calories and contains large amounts of fiber up to 2.3 g per 100 g of juice [16].

Either containing fat or carbohydrates, it contains a good amount of up to 25% in dry sepals leaves, in addition to the presence of nutrients of high nutritional value in varying amounts such as iron, potassium, phosphorus, calcium, manganese, sodium, aluminum and chromium. Organic acids such as malic acid, citric, tartaric and ascorbic acid, which are responsible for the acid taste in the drink and some other organic acids such as Protocatechuic acid phenolic acid and also contain the aromatic acids aromatic acid, and that the leaves are rich in riboflavin acid Niacin riboflavin [3].

The sepals contain amino acids and the most common amino acids are aspartic acid [17]. It also contains the dye of anthocyanin, which is responsible for the red color of the plant, as well as some coloring substances such as carotene and thiamine. In addition, it contains many vitamins, most notably ascorbic acid (vitamin C). This is considered an important source of this vitamin in addition to containing vitamins A, B1, B2 and B complex). The compounds also contain some of the classics such as Hibiscus hydrochloride with high physiological effect, which add high medicinal importance to the plant. These compounds are organic compounds that degrade acids by some enzymes to non-sugary substances [18].

In addition, the compounds also contain beta-compounds, which explains its dark red color when placed in acidic medium and contains some gels that may reach about 15% [19]. It is noted that the water extract of the saplings contains several important active compounds such as phenols, flavors, and tannins, which are different types of plant pigments that add various colors to the spores such as red, yellow and blue that are used in medicinal uses [20], and contains a chemical called Mucilage A refreshing, soothing substance is a simple, digestible sugar that adds flavor and sweetness to the drink of kora and also contains bacteriostatic substances [21].

Rosella seeds contain oil similar to the oil properties found in cotton seeds in terms of color, which amounts to about 17%. It can be edible, which is of high pharmacological importance. It is used for medical purposes in addition to containing a percentage of starch, carbohydrates, cellulose and cholesterol, And many organic acids such as oleic, formulaic, malvalic and citric acids [22]. Seeds are also an important source of many important nutrients such as potassium, phosphorus, magnesium, and micro-nutrients such as calcium, zinc, sulfur, sodium, and manganese [23]. In addition, the seeds contain a percentage of unsaturated fatty acids [24].

Leaves are also rich in chemicals active and important pharmaceutical, as they contain fats and fibers and many important compounds, such as Cliocosides and organic acids in addition to the food, including the most important calcium salts Calcium Oxalate. The roots of the Gujarat plant also contain Tartaric acid and Saponins [25].

## **6. The medical and pharmacological importance of rosella**

In recent years, medicinal plants have received great attention from researchers for the importance of pharmaceuticals that have contributed effectively to the development of the medical aspect in all its fields. Rosella is one of the most important medicinal plants. The pharaohs used it in many medicinal recipes and used it as a disinfectant. And applied much scientific research where the compounds played by its parts played an important role in the treatment of many of the pathogens that confront human health [18].

Dahiru et al. [26] found that the oral administration of the mouse with the red leaf extract has significant effects against cancerous tumors because it contains

the Protocatechuic Acid (PCA), which also helps to treat cirrhosis by removing the harmful effect of CCl<sub>4</sub>, And is a pharmacologically effective agent in minimizing the carcinogenic effect of diethylnitrosamine in the liver, reducing the work of carcinogenic genes and thus leading to the anti-cancer function of anti-cancer [19]. It is also used for the extraction of blood viscosity by reducing systolic and diastolic blood pressure. It is used to calm the contractions in the muscles of the uterus, stomach, intestines, pain and antispasmodic pain, as well as the pain of the chest Pectoral and is an antidote to tapeworms and cylindrical [27]. As well as containing anthocyanin, which acts as an antioxidant because of its possession of phenols [28].

Rosella is also used as a Diuretic, tonic for heartbeat and for calming nerves. It is also important in the treatment of atherosclerosis, facilitating digestion of Dyspepsia, coughs, stimulation of bowel movement and the ability to stimulate the body to resist many intestinal diseases [29]. It also helps to heal ulcers and promote the growth of hair follicles. The ethanol extracts of leaves of Gujarat also contribute to the reduction of the accumulation of antilithiatic compounds formed in the kidneys, except for the oxalate compounds [30].

The researchers found that the extract of the leaves of the giraffes acts as an antibacterial agent, inhibiting the growth of sensitive and antibiotic-resistant bacteria. It is effective in killing the bacteria produced by the bacteriogenic bacteria of *Bacillus* and *E. coli* and the microbes that cause tuberculosis. It is used to nourish the muscles to prevent infection caused by *Campylobacter* bacteria and aerobes, as well as to prevent contamination caused by delay in fat metabolism by giving it to the cow embryo as well as for the treatment of fever and cholera diseases due to the acidity of algal tea (pH 3.5) [31].

Odigie et al. [32] found that injecting the human with a serum containing the extract of the leaf leaves of the Gujarat plant helped control the level of sugar in the blood and reduced the effect of atherosclerosis. Recent research by Essa et al. [33]. The red leaf extract has an effective effect on the levels of urea and ammonia by protecting the liver against the harmful effects of ammonium chloride and also protecting the liver from the levels of fat oxidation products such as HP (hydroperoxides) and AST (aspartate transaminase) radical.

Lin et al. [27] found that the use of sepals extracts resulted in lowering blood cholesterol (8.3–14.4%) after 1 month of study on a sample of 42 people at a rate of three times a day.

The findings of Mckay et al. [34] show that the almost daily intake of sepals reduces blood pressure in adults with high blood pressure, as it has proved to be beneficial in many dietary changes, including lowering cholesterol levels in the blood.

Research has also shown that eating Gujarat tea contributed to the treatment of anemia in humans Anemia [35] found that drinking this drink had multiple activities on certain biochemical properties in humans and was safe in reducing the disease, Is used in African folk medicine to this day as an antipyretic, anthelmintic, and oral infection as a local application of external wounds and in Iran is used to treat insomnia [36].

## **7. Food and industrial uses of rosella**

The importance of the Gujarat plant lies in its many uses. It is an important food and industrial crop of high economic value in many countries of the world and is a good source of income. The different parts of the plant are used in many foods uses. Fresh and dried plant leaves are used in the preparation of hot and cold beverages.

Also in the manufacture of sweets and ice cream and ice cream, chocolate and ice mixtures for adding flavor and color to the food [37], and leaf leaves of the trees are also involved in several uses of food as the leaves of the green plant eaten fresh or cooked, It has a high nutritional value and is also used in the preparation of soups and salads, as well as in the preparation of spices as well as in some foods to add acid flavor to them [38]. On the other hand, cane seeds can be grounded or roasted to contain high protein, which is also a source of edible oil [39]. The seeds can also be used to prepare fodder crops for animals, especially sheep. The residues from the extraction of seed oil are also used to feed poultry and livestock, as well as to prepare fish food. The biological plant yield of leaves and fruits is also used with their contents in feeding the animals.

The plant of Gujarat is one of the most important industrial plants. The plant is used in many important industrial applications. It is grown as a source of natural fibers, which are used in the manufacture of plastic bags, clothing, fishing nets, and ropes, as well as the user's source in the preparation of industrial paper pulp [40]. The plant extracts are also used in the manufacture of cosmetics such as lipstick and food industries such as sweets and ice [41].

## 8. Conclusions

This study aims at understanding the importance of the Gujarat plant, its propagation and planting, the appropriate environmental conditions and its most important medical, industrial and agricultural uses. In the light of this study, we can conclude that the Gujarat plant is one of the most important medicinal plants and it is necessary to expand its cultivation and production because of its medical and industrial importance. And to expand the extraction of medicinal compounds from it and its use in the pharmaceutical industries.

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