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A Review on Medicinal and Pharmacological Importance of Roselle Hibiscus sabdariffa L

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Abstract: ***Roselle, Hibiscus sabdariffa L. (family Malvaceae) is one of the most important and popular medicinal plants. Roselle is native from India to Malaysia, where it is commonly cultivated, and must have been carried at an early date to Africa. It is known as karkadeh in Asia, Pundi palle in South Asia, isapa in Africa Florida Cranberry in America. Recent researches & studies shown that the use of Roselle plant in medical, food & industrial fields also. It is used in cold &warm drinks, jams & jellies. Its use as emollient, laxative, antioxidant, nutritive, antihypertensive, antifungal agent. Rosella helps in digestion, refreshing, moisturizing & used in treatment of cancer.***
Keywords: rosella, medicinal plant, pharmacological use

I. INTRODUCTION

Roselle, Hibiscus sabdariffa L. (family Malvaceae) is one of the most important & popular medicinal plants. It is native from India to Malaysia, where it is commonly cultivated, and must have been carried at an early date to Africa. In some parts of Africa, the seeds are reported to be used for its oil. The seeds are reported to be rich in proteins, dietary fibre, carbohydrates and fats. 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 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 rich source of 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 in refreshing beverages & as preservative in jams and jellies, pickle.

II. PLANT DESCRIPTION

A. *Phytochemicals*

1) *Leaves:* Leaves are usually alternate, 3 to 5 in (7.5-12.5 cm) long, green with reddish veins and long or short petioles. Leaves of young seedlings and upper leaves of older plants are simple; lower leaves are deeply 3- to 5- or even 7-lobed; the margins are toothed. Polyphenolic compounds containing neochlorogenic acid, colorogenic acid, crypt chlorogenic acid. Flavonoid compounds – quercetin, kaempferol. 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]
2) *Flowers:* Flowers are axillary, solitary, predominantly yellow and red, regular, pedicellate; epicalyx of about 12 reddish bracts, connate at base, 10–12 mm long; calyx 15–30 mm long (enlarging in fruit to 40 mm), 5 reddish, large, accrescent, fleshy sepals, all sepals fused at base. Anthocyanins & Protocatechuic Acid (PCA), gossypetin, hemisecting, sabdaretine, myrtillin. The sepals contain amino acids and the most common amino acids are aspartic acid [17].
3) *Seeds:* Good source of lipid-soluble antioxidants, particularly gamma tocopherol. Rosella seeds contain oil similar to the oil properties found in cotton seeds in terms of colour, 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 micronutrients such as calcium, zinc, sulphur, sodium, and manganese [23]. In addition, the seeds contain a percentage of unsaturated fatty acids [24].

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III. 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-Qadisiya 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].

It also contains the dye of anthocyanin, which is responsible for the red colour of the plant, as well as some colouring 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, B2and 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].

IV. ROSELLE BENEFITS AND MEDICINAL USES

Roselle is a plant widely recognized for its medicinal properties. It is primarily known for its vibrant red calyx, which is used to make a popular herbal tea known as hibiscus tea. Here are some of the roselle benefits and medicinal uses:

1) *Rich in Antioxidants:* Roselle is packed with antioxidants, such as flavonoids and anthocyanins. These compounds help protect the body against damage caused by free radicals and oxidative stress.
2) *Blood Pressure Management:* Hibiscus tea made from roselle has been shown to have blood pressure-lowering effects. It may help lower both systolic and diastolic blood pressure in individuals with hypertension. However, it's essential to consult with a healthcare professional before using roselle as a blood pressure management tool, especially if you're already on medication.
3) *Heart Health:* The antioxidant properties of roselle, combined with its potential blood pressure-lowering effects, may contribute to heart health. Some studies suggest that consuming hibiscus tea made from roselle may help reduce the risk of heart disease by improving cholesterol levels and reducing inflammation.
4) *Digestive Support:* Roselle has been used traditionally to support digestive health. It may help alleviate symptoms of indigestion, constipation, and stomach discomfort. The plant contains natural enzymes that promote healthy digestion.

5) *Weight Management:* Roselle may aid in weight management by inhibiting the production of amylase, an enzyme that helps break down carbohydrates. By slowing down carbohydrate absorption, roselle may contribute to weight loss or weight maintenance efforts.
6) *Liver Protection:* The antioxidant and anti-inflammatory properties of roselle may help protect the liver from damage caused by oxidative stress and inflammation. It may also support the liver's detoxification processes.
7) *Immune Support:* Roselle is rich in vitamin C, which is known for its immune-boosting properties. Consuming roselle or hibiscus tea made from roselle may help strengthen the immune system and protect against common illnesses.
8) *Antimicrobial Activity:* Some research suggests that roselle extracts may possess antimicrobial properties. It may help inhibit the growth of certain bacteria and fungi, contributing to the prevention and management of infections.
9) *Anti-inflammatory Effects:* Roselle contains compounds that have anti-inflammatory properties. These properties may help reduce inflammation in the body, which is associated with various chronic diseases.
10) *Menstrual Pain:* Provides relief from cramps and menstrual pain. Helps in restoring hormonal balance (which can reduce other symptoms of menstruation like mood swings, depression, and overeating)
11) *Skincare:* With a reputation for anti-aging properties, the roselle plant is quite popular in the beauty and skincare world. It has been used to make a face/body scrub, facial steams, clay masks, etc. The roselle flowers are beneficial because of the antioxidants that they possess – these help to neutralize the effects of free radicals, and leaves you glowing with health.
12) *Ornamentation:* Primarily, the Roselle is a flower, and so one of its primary uses is as part of flower arrangements. The red roselle flowers themselves can be used for medicinal purposes, or you could use its many fresh calyces as part of a unique touch for your decorative piece[43].

V. HOW TO PREPARE ROSELLE FOR MEDICINAL USE

Roselle can be prepared and used as medicine in various forms. Here are a few common ways to prepare and use roselle for its medicinal properties:

1) *Hibiscus Tea:* One of the most popular ways to consume roselle is by making hibiscus tea. Here's a simple method to prepare roselle tea:
- Bring water to a boil and add dried roselle calyces or tea bags to the boiling water.
- Let it simmer for about 5 to 10 minutes.
- Remove from heat, strain the liquid, and sweeten if desired (with honey or another natural sweetener).
- You can consume the tea hot or let it cool and serve it over ice.

2) *Roselle Extract:* Roselle extract can be made by infusing dried roselle calyces in alcohol, such as vodka or rum. This method extracts the beneficial compounds from the plant. The resulting extract can be used in various ways, including adding it to beverages, desserts, or other recipes.
3) *Capsules or Supplements:* Roselle is available in the form of capsules or supplements, usually as hibiscus extract. Follow the dosage instructions provided by the manufacturer or consult with a healthcare professional for guidance on the appropriate dosage.
4) *Topical Applications:* While less common, roselle can be used topically in the form of poultices or compresses to soothe skin conditions, such as minor burns, rashes, or insect bites. Crushed fresh or dried roselle calyces can be applied directly to the affected area or mixed with a carrier oil or ointment for easier application.

When preparing roselle as medicine, it's important to consider the quality and source of the plant material. If using dried calyces, ensure they are obtained from a reputable source to ensure purity and potency. Additionally, it's recommended to start with a small amount and gradually increase the dosage, if needed, while monitoring your body's response.

It's worth mentioning that while roselle is generally considered safe for most people, it may interact with certain medications or have contraindications for certain individuals. If you have any underlying health conditions or are taking medications, it's best to consult with a healthcare professional before using roselle as a medicinal remedy.

VI. HOW TO EAT

1) Fleshy flower calyces are rich in citric acid, pectin, anthocyanin pigments and vitamins and are used fresh in salad and for making roselle wine, syrup, gelatine, refreshing beverages, puddings, chutneys, pickles, cakes, herbal teas, jellies, marmalades, ices, ice cream, sherbets, butter, pies, sauces, tarts and other desserts.
2) Roselle has been recommended as a source of pectin for the fruit-preserving industry in Pakistan.

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3) Calyces are used for food colouring in America, Asia and Europe.
4) Calyces are used to colour and flavour rum in the Caribbean and to add colour and flavour to herbal teas and beverages.
5) Drink is made from the fresh fruit, and it is considered an integral part of Christmas celebration in Caribbean.
6) Inexpensive beverages are commonly consumed and are typically made from fresh fruits, juices or extracts in Mexico and Central America, agues frescas.
7) Refreshing and very popular beverage can be made by boiling the calyx, sweetening it with sugar and adding ginger.
8) Calyx infusion, called 'Sudan tea', is taken to relieve coughs in East Africa.
9) Roselle calyces are commonly used to make a sugary herbal tea that is commonly sold on the street in Africa especially Sahel.
10) Calyces are used to make cold, sweet drinks popular in social events, often mixed with mint leaves, dissolved menthol candy, and or various fruit flavours in Mali and Senegal.
11) Carib Brewery Trinidad Limited produces a Shandy Sorrel in which roselle tea is combined with beer in Trinidad and Tobago.
12) Agua de Jamaica (water of roselle) is most often homemade and drank chilled, and Jamaica Ipa is another popular drink in Mexico and Central America, which is made from calyces of the roselle in Mexico and Central America.
13) Roselle calyces are sold in bags usually labelled Flor de Jamaica in health food stores in the United States for making a tea that is high in vitamin C, an anthocyanin.
14) Jarritos, a popular brand of Mexican soft drinks, makes a Jamaica flavoured carbonated beverage.
15) Imported Jarritos is commonly available in the United States.
16) Green leaves are used as spinach in a fish and rice dish called thiéboudieune in Senegal.
17) Green leaves form the main ingredient in making chin baung kyaw curry in Myanmar.
18) Leaves and calyces are acidic, eaten as cooked vegetable, good with fermented fish and pork in Assam.
19) Jelly is prepared from calyces.
20) Tender young leaves and stems are consumed raw or cooked in salads; as a potherb and as a seasoning in curries; they have acid, rhubarb– like flavor.
21) Calyx is rich in citric acid and pectin and so is beneficial for making jams, jellies, etc.
22) It is also used to add a red colour and to flavor to herb teas.
23) Using marinades of roselle calyx extract for fried beef patties was found to reduce the formation of carcinogenic heterocyclic aromatic amines.
24) Calyces are gathered for sale either fresh or dried; they are whole in preparing melon soup together with other soup ingredients and in the production of roselle jams in Nigeria.
25) A pleasantly flavoured beverage produced as an infusion from the calyx has been widely cherished in Nigeria and is used for refreshment and entertainment in home and public gatherings and also sold as a local drink.
26) Calyx has been chewed to alleviate thirst on long desert tracks of Moslems.
27) Dry calyx is used to produce a flavour some and healthy drink rich in vitamin C, and dried calyces are used for tea, jelly, marmalade, ices, ice cream, sorbets, butter, pies, sauces, tarts and other desserts in Sudan.
28) Iced red hibiscus tea is consumed daily in Sudan; in Spain it is called 'quimbombe chino'.
29) Roselle herbal tea is normally drunk in Thailand on its own or mixed with normal tea to reduce cholesterol.
30) Roselle calyces are harvested fresh to produce pro-health drink due to high contents of vitamin C and anthocyanins in Malaysia.
31) Young leaves and shoots cooked as vegetables and the calyces used to flavor fish and in curries in Malaysia.
32) Young leaves, stems, calyx and fruits are used for cooking fish in Vietnam.
33) Tender young leaves and stems eaten raw or cooked in Nepal and elsewhere.
34) Leaves used as food complement in Angola.
35) Seeds have been reported to be eaten in some parts of Africa.
36) Furundu, a meat substitute, is traditionally prepared by cooking Hibiscus sabdariffa seed and then fermenting it for 9 days.
37) Yanyanku and Ikpiru, made by the fermentation of Hibiscus sabdariffa seeds, are used to produce food condiments in Benin.
38) Seeds are roasted, ground into a powder and used in oily soups and sauces.
39) Roasted seeds have been used as a coffee substitute that is said to have aphrodisiac properties.
40) Roots are edible but very fibrous, mucilaginous and rather bland, lacking flavor

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VII. CONCLUSIONS

This study aims at understanding the importance of the plant, it's propagation and, the appropriate environmental conditions and its most important medical, industrial and agricultural uses. In 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.

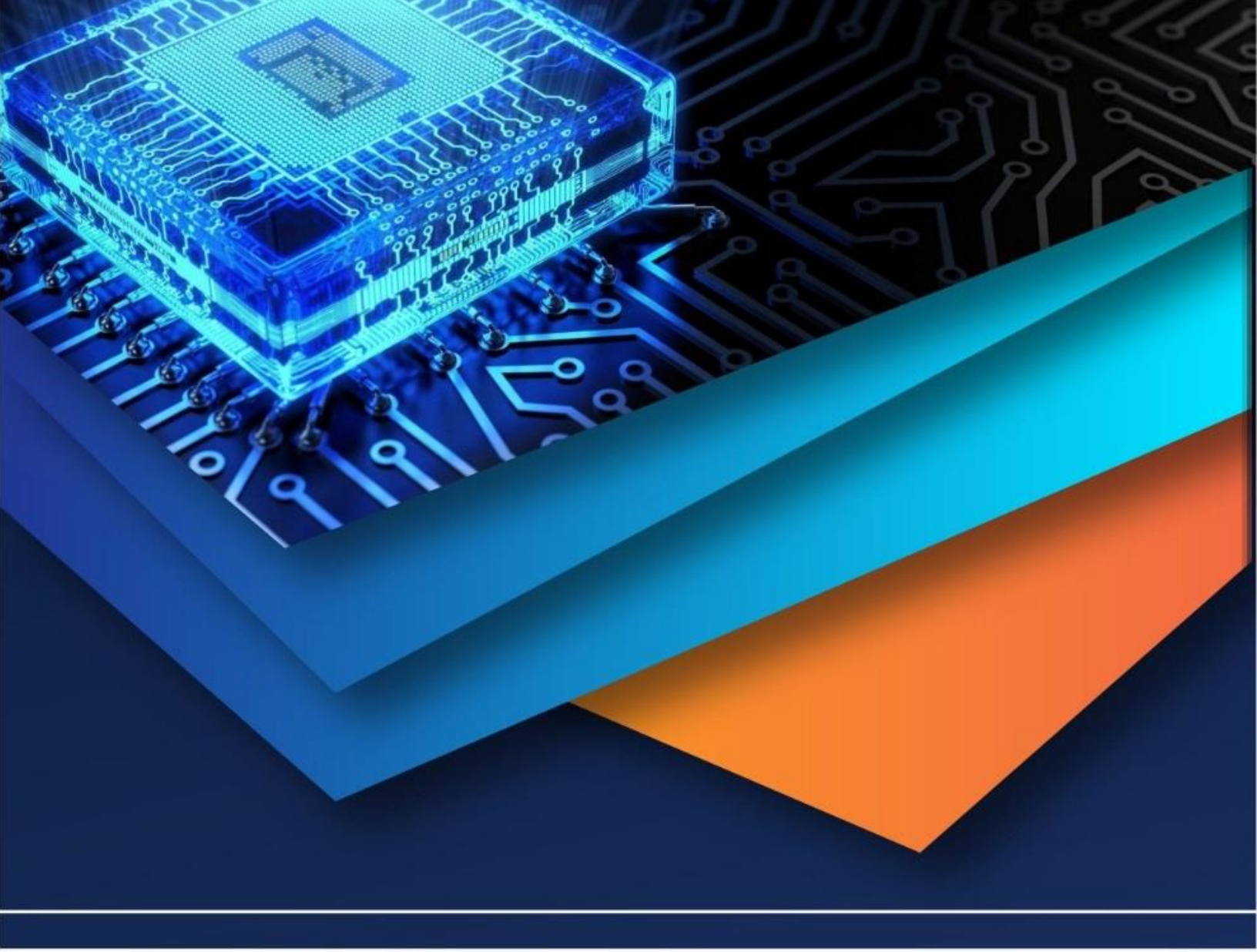
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