Abstract

Hibiscus sabdariffa Linn. var. sabdariffa, commonly known as Sorrel or Lal Ambari is widely grown in Africa and many countries in the Caribbean and Latin America as an important commercial crop for its uses in food, feed, medicine and aesthetic value. In India also it is cultivated on a small scale for edible calyces and ornamental purposes in home gardens. It is used as medicine, herbal tea, and safer food colouring agent especially in confectionaries but to a small extent. The information available in literature and author's observations on possibilities of making a soft drink by utilizing its colouring constituent and sour taste have been discussed in this paper to promote the potential of this plant in manufacturing a natural and medicinal soft drink and food items like chutney and sauces.

Keywords: Hibiscus sabdariffa Linn. var. sabdariffa, Sorrel, Lemon bush, Lal Ambari, Patwa, Colouring agent, Herbal tea, Herbal medicine.

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Introduction

The Sorrel or Lal Ambari, Hibiscus sabdariffa Linn. var. sabdariffa is a shrub belonging to the family Malvaceae. It is commonly known as Sorrel, Sour-sore, Queensland Jelly plant, Jelly okra, Lemon bush, Florida cranberry in different countries. It is thought of native from Asia (India to Malaysia) or Tropical Africa. The plant is widely grown in tropics like Caribbean, Central America, India, Africa, Brazil, Australia, Hawaii, Florida, Philippines, etc. as a home garden crop. In Sudan, it is a major crop of export especially in western part where it occupies second place area wise after pearl millet followed by Sesamum. Often, growers will harvest bracts, dry and store for their regular use or sending to Karkadi market (a famous commercial place for sorrel in West Sudan).

It is an annual, erect, bushy, herbaceous shrub up to 2 m tall with smooth or semi-hairy, cylindrical, typical red stem and flowers borne singly in the leaf axis are up to 5 cm wide, yellow or buff with rows or maroon eye and turn pink as they wither at the end of the day (Muller et al, 1955). At this stage the typically red calyx consisting of 5 large sepals with a collar (epicalyx) of 8-12 slim, pointed bracts or bracteoles around the base, begin to enlarge, becomes fleshy, crisp but juicy, 2-5 cm long and fully encloses the velvety, 1-2 cm long capsule (Robyna, 1968). These bracts are beautiful possessing basic colours like red, brown, yellow and their light and dark combinations.

The species Hibiscus sabdariffa Linn. comprises a large...
number of cultivated types which, on the basis of their growth habit or end use, are classified broadly under two varieties, *H. sabdariffa* Linn. var. *sabdariffa* and *H. sabdariffa* Linn. var. *altissima* Wester. Former is generally bushy and pigmented and cultivated for the edible calyces; the latter includes tall-growing, unbranched types bearing inedible calyces and mainly cultivated for the stem fibre, roselle.

In India, it is known as *Lal ambari* or *Patwa* (Hindi); *Lal mista*, *Chukar* (Bengali); *Lal ambadi* (Marathi); *Yerra gogu* (Telugu); *Pulichchai kerai*, *Gogu* (Tamil); *Pulachakiri*, *Pundibija* (Kannada); *Polechi*, *Pulichchai* (Malayalam) and *Chukiar* in Assamese as well as *Lal thepa* by local people of Jharkhand. Sorrel is cultivated in various parts of Punjab, Uttar Pradesh, Andhra Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa and West Bengal during April to November. The propagation is done by seeds. The edible fleshy calyces are collected after 15-20 days of flowering. Rest of the crop is left in the field until seeds are ready for threshing. The calyces can be dried and stored in air-tight containers (The Wealth of India, 1959).

### Chemical Composition

Fresh calyces contain: citric acid, 3.7; pectin, 3.19; crude protein, 1.46; and crude fibre, 1.58% and potassium, sodium, manganese, aluminium, magnesium, etc. are present in traces. They also contain mucilage, calcium citrate and ascorbic acid (The Wealth of India, 1959).

### Toxicity

Recently a study conducted on rats at Department of Biochemistry, Federal University of Technology, Akure, Nigeria on toxicological effects of aqueous-methanolic extract of the calyces revealed that prolong usage of this extract at 15-dose level each dose consisting of 250mg/kg could cause liver injury while the effect was mild at small dose levels (1-10). However, the average consumption of 150-180mg/kg per day appears safe, the extract should be taken with caution bearing in mind that higher doses could affect the liver (Akindahunsi & Olaleye, 2003).

### Utilization

#### Medicinal soft drink

During flowering season, succulent flower bracts are harvested, cleaned and used fresh or stored for future use. For preparing its water extract or soft drink 3-5 bracts are soaked into a glass of clean water (free from salts) for 4-6 hours. Such drinks prepared at larger scale may be stored in refrigerator and used safely up to one month.

In Sudan, it is strongly believed that regular intake of this soft drink twice a day at least for three days reduces blood pressure. This drink in the similar way is also recommended for cough, cold and malaria cure. Its regular intake as cold drink (decoction with ice) reduces alcoholic effects. Sorrel drinks are integral part of Christmas treats in the Caribbean (Ann Hilton, 1996) and sorrel concentrates are easily available in the malls (personal communication with EI Yousuf Siddig from Sudan and Ivan Churaman from Trinidad and Tobago).

In addition to this the drink prepared from calyces considered to be effective as refreshing, cooling, diuretic, mild laxative, intestinal antiseptic, and good to cure high blood pressure, heart and nerve diseases and calcified arteries. It is also reported to be astringent, resolvent, cholagogue, digestive, and stomachic and a remedy for abscesses.
A recent study conducted on rats at Department of Physiology, College of Medicine of the University of Lagos, Nigeria has confirmed that aqueous extract of sorrel exhibits antihypertensive and cardioprotective effects in vivo and supports the public belief that it may be a useful antihypertensive agent (Odigie et al, 2003).

US has developed sorrel concentrate at par with lemon, orange, apple, grape fruit, etc. which has pretty good market at least in the Caribbean.

Food

The richness of bracts in citric acid and pectin supports its usefulness in chutney, jelly and preserves. It may be blended with high flavoured fruits, cakes, pies, soups, syrups and liquors. Tender leaves are eaten as salad or for seasoning curries. They are acid to taste and may be used for the preservation of jelly, flavouring extracts, syrup and wine. Sorrel bracts are good source for colouring food items and widely used in confectionary in Sudan (personal communication with El Yousuf Siddig). In Jharkhand State (India) sorrel chutney and drinks are also commonly consumed by local people (personal communication with Christopher Abraham Lakra of Jharkhand).

The seeds are bitter in taste but are eaten in some parts of Africa. They contain oil, which resembles cottonseed oil. Seeds have been used as an aphrodisiac coffee substitute (Watt & Breyer-Brandwijk, 1962).

Other uses

Animal Feed

Sorrel seeds and residual cake after extracting oil are used as animal feed while leaves are delicacy to sheep and goats in Sudan (personal communication with El Yousuf Siddig).

Biocontrol Agent

Sorrel is an exceptionally preferred food plant for Pink Hibiscus mealy bug, Maconellicoccus hirsutus (Green), which is reported to infest 300 plant species in the Caribbean (Gautam et al, 2000). It is evident from experimentation in Grenada that a group of twenty sorrel plants infested with the mealy bugs can easily yield, 3000-5000 predatory beetles, Cryptolaemus montrouzieri (Green) depending on pest density. The sorrel capsules turn brown and split open when mature and dry even though they harbour the pink
mealy bug as well as ladybird stages. These beetles are potential biological control agents, and can be collected by knocking them into a container, using a manual aspirator. These plants act as reservoirs in the horticultural ecosystem and allow perpetuation of the ladybirds for sustainable insect pest management (Gautam & Ronald, 2003) besides preservation of biodiversity. The technology has potential for duplication in India in order to cut down the cost of production of commercially available predator, when multiplied in the laboratory.

**Conclusion**

Industries engaged in food preservation are always on wheels to roll down commercially viable raw material and convert it into a product, which could fetch more revenue with prolonged shelf life and acceptability. It is evident from survey that several African countries are dependent on sorrel based drinks. Similar efforts may be put forth by the Indian industries.

Home-made *chutneys* based on Mango (*Aam*), Mentha (*Pudina*), Chilli (*Mirch*), Coriander (*Dhania*), Tamarind (*Imli*), etc. are indispensable items of our daily meals hence they may either be supplemented or replaced with sorrel bracts in order to enjoy home-made fresh *chutney*. Companies engaged on commercial production of *chutney/sauce* or similar products may exploit this plant and promote its cultivation. Common people can also grow a few plants in home gardens and still enjoy home-made herbal tea besides aesthetic to the surrounding.

**References**


Patents filed /granted on sorrel products

1. Application of *Hibiscus sabdariffa* Linn. extractive in preparing medicine for inhibiting cardiac and cerebral vascular diseases

   Patent number: CN1421226; Publication date: 2003-06-04; Inventor: Wang Chaozhong (CN); Applicant: Huansheng Biolog Sci Tech Co Ltd (CN).

   Abstract: It is found that *H. sabdariffa* Linn. extractive has the functions of reducing triglyceride and cholesterol in blood, inhibiting the oxidation of low-density lipoprotein, decreasing the fat deposition on arterial endodermis, improving the smooth muscle migration caused by spumescent cell formed on the blood vessel wall, etc. The present invention provides the application of the *H. sabdariffa* Linn. extractive in preparing medicine for inhibiting cardiac and cerebral vascular diseases.

2. Use of the *Hibiscus sabdariffa* extract in the preparation of a medicament


   Abstract: Use of the *H. sabdariffa* extract in the preparation of a medicament for countering oxidation of low-density lipoproteins, decreasing triglyceride or cholesterol levels in plasma, or inhibiting atherosclerosis.

3. Method to counter oxidation of LDL, decrease triglyceride or cholesterol and inhibit atherosclerosis using *Hibiscus sabdariffa* extract


   Abstract: A method for countering oxidization of low-density lipoproteins, reducing cholesterol or triglyceride in plasma or inhibiting atherosclerosis comprises administering an effective amount of a *H. sabdariffa* extract.

4. Process for producing *Hibiscus sabdariffa* jam and fruit juice beverage

   Patent number: CN1156552; Publication date: 1997-08-13; Inventor: Fu Xiangyuan (CN); Applicant: Fu Xiangyuan (CN).

   Abstract: A Luoshen sunflower jam is made up of Luoshen sunflower that contains fruit acid, pectin and vitamin C through addition of glucose solution and mineral water and ordinary-temp immersion. Adding mineral water to said jam produces the fruit juice beverage.

5. *Hibiscus sabdariffa* beverage and its preparation method

   Patent number: CN1115219; Publication date: 1996-01-24; Inventor: Wenyi Chang (CN); Applicant: Chang Wenyi (CN).

   Abstract: The beverage is made up of sepal of roselle calyx, jujube, white sugar, honey and water through immersion, filtering, steam disinfecting, etc. and features high nutritive value as it is rich in amino acids and vitamins C, B1 and B2 and good eating enjoyment.

6. Tea bag of *Hibiscus sabdariffa* Linn. and its preparation

   Patent number: JP56029522; Publication date: 1981-03-24; Inventor: Sato Mutsuo; Applicant: Hounan Shokuhin Kogyo KK

   Abstract: To obtain the titled tea bag useful for a fancy drink, having effect of herb medicine on diabetes, hypertension, malum cordis, etc. by adhering uniformly and firmly a specific amount of *Stevia* extract powder as a sweetener to dried ground pieces of *H. sabdariffa* Linn. followed by packing.

   Dried ground pieces of *H. sabdariffa* Linn. is sprayed with 1-3wt% aqueous solution or alcoholic solution of *Stevia* extract powder so that the powder is adhered to *H. sabdariffa* Linn. uniformly and firmly. A dryer, etc. is used to make water content of the prepared product 10 wt% evaporate water or alcohol and it is packed in tea bags. *H. sabdariffa* Linn. contains no caffeine, has effect of herb medicine on diabetes, hypertension, malum cordis, renopathy, respiratory diseases, diuresis, reduction of cholesterol in the blood, etc. and exhibits bright ruby and proper acidity. While *Stevia* extract powder has sweetness about 100 times as much as that of sugar. an amount of the latter per bag is preferably 0.02-0.04g. Even excess drinking is harmless (http://ep.espacenet.com).