

## Hibiscus sabdariffa

L.

Malvaceae

### LOCAL NAMES

English (white sorrel,rozelle,roselle,red sorrel,jamaica); Malay (asam susur); Thai (kachieb priew)

### BOTANIC DESCRIPTION

Hibiscus sabdariffa is an erect, mostly branched, annual shrub. Stem reddish in colour and up to 3.5 m tall, with a deep penetrating taproot.

Leaves variously colored, dark green to red; leaves alternate, glabrous, long-petiolate, palmately divided into 3-7 lobes, with serrate margins.

Flowers large, short-peduncled, red to yellow with dark center. The accrescent large and fleshy sepals become enlarged and succulent, making excellent jelly.

Capsules ovoid, beaked and hairy 5 cm long, 5.3 cm wide.

Several cultivars are known, the best known are: 'Victor', 'Rico' and 'Archer'. Of the botanical varieties: var. sabdariffa, has red or pale yellow inflated edible calyces, but poor fiber; var. altissima is grown for its fiber, but has inedible calyces. There is a green form known as the white sorrel, with greenish-white fruits.

### BIOLOGY

H. sabdariffa is a hermaphroditic and insect pollinated shrub. The species hybridizes with Hibiscus cannabinus. Roselle plants exhibit marked photoperiodism, not flowering at short days of 13.5 hours, but flowering at 11 hours. In the United States plants do not flower until short days of late fall or early winter.



Detail of flowers and leaves. (Morton J.)



Harvested calyces. (Armstrong W.P.)

**ECOLOGY**

H. sabdariffa tolerates a warm and humid tropical climate, and is susceptible to damage from frost and fog.

**BIOPHYSICAL LIMITS**

Altitude: 0-1 250 m

Mean annual temperature: 23 deg C

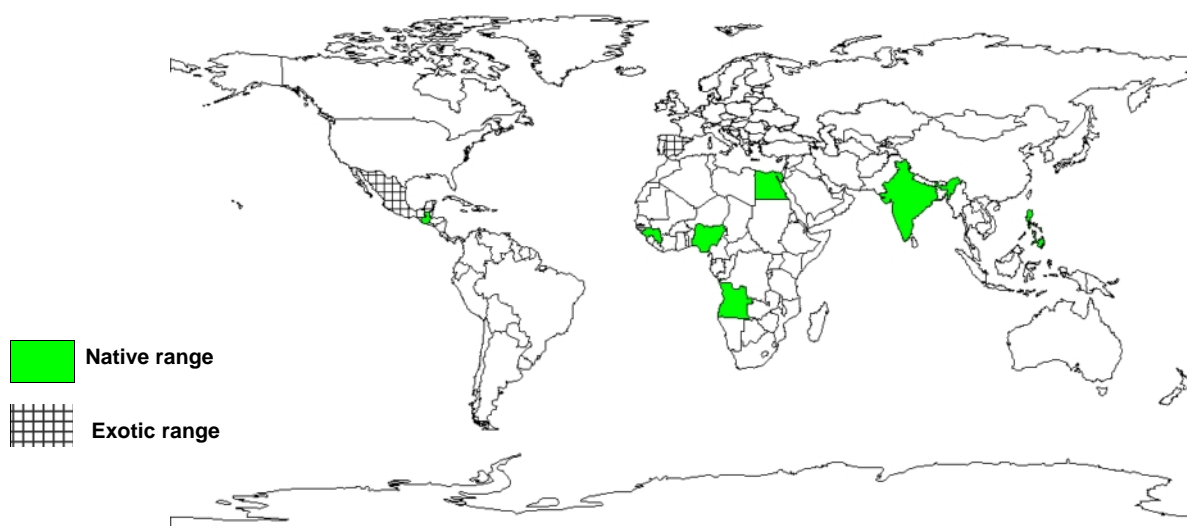
Mean annual rainfall: 1 500–2 000 mm

Soil type: Roselle requires a permeable soil, a friable sandy loam with humus being preferable. However, it will adapt to a variety of soils (pH of 4.5-8.0).

**DOCUMENTED SPECIES DISTRIBUTION**

Native: Angola, Egypt, Guatemala, Guinea, India, Myanmar, Nigeria, Philippines

Exotic: Jamaica, Mexico, Spain, United States of America



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

**PRODUCTS**

**Food:** Source of a red beverage known as 'jamaica' in Mexico. Calyx, called karkade in Switzerland, is used in jams, jellies, sauces, and wines. In the west Indies and elsewhere in the tropics the fleshy calyces are used fresh for making roselle wine, jelly, syrup, gelatin, refreshing beverages, pudding, and cakes, and dried roselle is used for tea, jelly, marmalade, ices, ice-cream, sherbets, butter, pies, sauces, tarts, and other desserts. Tender leaves and stalks are eaten as salad and a pot-herb. The leaves are used for seasoning curries and also consumed as vegetable.

**Apiculture:** Flowers are a source of pollen and nectar for bees.

**Fuel:** H. sabdariffa stem and wood are potential raw materials for charcoal making.

**Fibre:** Roselle is cultivated primarily for the bast fiber obtained from the stems. The fiber strands, up to 1.5 m long, are used for cordage and as a substitute for jute in the manufacture of burlap.

**Lipids:** Roselle seed oil is rich in linoleic acid and is a candidate source for vegetable oils.

**Poison:** H. sabdariffa is toxic to *Schistosoma mansoni* at 50-100 ppm, showing both miracidicidal and cercaricidal activity.

**Medicine:** The roselle is useful in arteriosclerosis. Reported to be antiseptic, aphrodisiac, astringent, cholagogue, demulcent, digestive, diuretic, emollient, purgative, refrigerant, resolvent, sedative, stomachic, and tonic, roselle is a folk remedy for abscesses, bilious conditions, cancer, cough, debility, dyspepsia, dysuria, fever, hangover, heart ailments, hypertension, neurosis, scurvy, and strangury. The drink made by placing the calyx in water, is said to be a folk remedy for cancer. Medicinally, leaves are emollient, and are much used in Guinea as a diuretic, refrigerant and sedative; fruits are antiscorbutic; leaves, seeds, and ripe calyces are antiscorbutic. In Myanmar, the seeds are used for debility and the leaves as emollient. Taiwanese regard the seed as diuretic, laxative and tonic. In Philippines the bitter root is used as an aperitive and tonic. Angolans use the mucilaginous leaves as an emollient and as a soothing cough remedy. Central Africans poultice the leaves on abscesses. Ingestion of the plant extract reportedly decreases the rate of absorption of alcohol.

**Other products:** Used for pulp and paper manufacture. Flavonoids from roselle have numerous potential applications as natural food colourants. A typical application is intensification of natural colour of fruit purees for yoghurt, in the west Indies the calyces are used in colouring and flavouring rum.

**SERVICES**

**Ornamental:** The roselle is a multiple-use species with beautiful flowers.

**Intercropping:** A crop rotation system of legume green-manure crop, roselle and then corn is recommended to limit the parasitic root-knot nematode, *Heterodera radicicola*.

**TREE MANAGEMENT**

It is not shade tolerant and must be kept weed-free, weeding for the first month is important. Tolerate floods, heavy winds or stagnant water. Applications of stable manure or commercial fertilizers are beneficial, roselle responds favourably to applications of nitrogen, 45 kg/ha is recommended in India, applied in the form of compost or mineral fertilizer in conjunction with a small quantity of phosphate. In Java green manure from *Mimosa invisa* is plowed under before it starts to produce mature seeds. Also in Java the following fertilizer rates are recommended for roselle: 80 kg N/ha, 36–54 kg P<sub>2</sub>O<sub>5</sub>/ha and 75–100 kg K<sub>2</sub>O/ha. Yields for roselle in legume fallow plots are significantly high. Generally the crop should be ready for picking 5-6 months after planting or 15-20 days after flowering continuing for about 2 months. In Indonesia fiber is harvested is about 10 months from planting. When grown for its fiber, it is planted closely to produce long stems with little foilage.

**PESTS AND DISEASES**

Roselle is attacked by several fungi: *Aecidium garckeianum*, *A. hibiscisurattense*, *Alternaria macrospora*, *Cercospora abelmoschi*, *C. malaysensis*, *Corynespora cassiicola*, *Cylindrocladium scoparium*, *Diplodia hibiscina*, *Fusarium decemcellulare*, *F. sarcochroum*, *F. solani*, *F. vasinfectum*, *Guignardia hibisci-sabdariffae*, *Irenopsis molleriana*, *Leveillula taurica*, *Microsphaera euphorbiae*, *Phoma sabdariffae*, *Phymatotrichum omnivorum*, *Phytophthora parasitica*, *Phytophthora terretris*, *Pythium perniciosum*, *Rhizoctonia solani*, *Sclerotinia fuckeliana*, *S. sclerotiorum*, *Sclerotium rolfsii*. Roselle plants are also attacked by several viruses: Leaf curl, Cotton leaf curl and yellow vein mosaic. The bacterium, *Bacillus solanacearum*, has been isolated from roselle. Roselle is seriously attacked by root-knot nematodes: *Meloidogyne arenaria*, *M. incognita acrita* and *M. javanica*. Among the insect pests which attack roselle are: *Anomis erosa*, *Chaetocnema* spp., *Cosmophila erosa*, *Dysdercus cingulatus*, *D. poecilus*, *Drosicha townsendi*, *Nistora gemella*, *Phenacoccus hirsutus*, *Pseudococcus filamentosus* and *Tectocoris diophthalmus*. *H. sabdariffa* is severely affected by *Phytophthora* [*nicotianae* var.] *parasitica* and *Rhizoctonia bataticola* [*Macrophomina phaseolina*] which cause foot and stem and root rot diseases. The powdery mildew *Leveillula taurica* attacks *H. sabdariffa*.

**FURTHER READNG**

Chin AHG and Nushirwan Z. 1990. Properties of vegetable oils from some unexplored sources in Malaysia. *MARDI Research Journal*. 18(2): 261-265.

Elsheikh SH et al. 1990. Toxicity of certain Sudanese plant extracts to cercariae and miracidia of *Schistosoma mansoni*. *International Journal of Crude Drug Research*. 28(4): 241-245.

Khairy EA et al. 1971. Occurrence of powdery mildews of roselle and mulberry in U.A.R. (Egypt). *Phytopathologia-Mediterranea*. 10(3) 269-271.

Labatut ML. 1989. Renewed interest for flavonoids of Sandalwood and Roselle as natural red colourant for food. *Food Ingredients Europe, conference proceedings 1989*. 85-88.

MacMillan HF et al. 1991. *Tropical planting and gardening*. Malayan Nature Society.

Prem Nath and Denton L. 1980. Leafy vegetables in Nigeria. *Plant Genetic Resources Newsletter*, No. 42, 14-17.

Saikia CN, Goswami T and Ali F. 1997. Evaluation of pulp and paper making characteristics of certain fast growing plants. *Wood Science and Technology*. 31(6): 467-475.

Singh DP and Mishra CBP. 1987. Field reaction of mesta (*Hibiscus cannabinus* and *H. sabdariffa*) strains to foot and stem rot and root rot diseases. *Indian Journal of Plant Pathology*. 5(2): 203-204.

**SUGGESTED CITATION**

Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 *Agroforestry Database: a tree reference and selection guide version 4.0* (<http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>)