

Roselle in Senegal and Mali

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Whenever a bus or taxi rolls to a stop during a trip anywhere in Mali, a crowd of young girls and women selling snacks and beverages is sure to quickly surround the vehicle. “*Ji suma bè! Da bilenni bè!* There’s cold water! There’s *da bilenni!*” For CFA25 (US\$0.05), passengers can buy a little plastic bag of the frozen - but quickly melting - beverage. On a hot day, you might see an entire bus load of passengers sucking the sweet, dark red juice from the bags.

The red juice is extracted from *Hibiscus sabdariffa*. Choosing a name in layman’s terms is not easy. In Bambara/Dioula spoken in Mali, Burkina Faso, and Ivory Coast, the red beverage is called *da bilenni*, the plant itself, *da*. In neighbouring Senegal it is known by its Wolof name, *bissap*. In French, *oseille de Guinée*, in Spanish, *Flor de Jamaica*, and across North Africa, *karkadé*. In English, the most common names are roselle and sorrel.



Green calyx of roselle.

A stroll through any peanut field in Senegal or Mali will provide glimpses of this multi-functional plant whose origins are much disputed. While many wild varieties can be found in Senegal and Mali, the varieties most commonly cultivated are the red-stemmed *ruber*, and the greenish-yellow *albus*. A taller, woodier variety is also grown for its fibres. The climate of the Sudanian agroecological zone stretching across West Africa is ideal for roselle production. The plant needs between 800 to 1600 mm of continuous rainfall, with a minimum of 100 to 150 mm per month during its vegetative growth. It is a short-day plant and requires temperatures between 18 and 35° C. Roselle can grow to heights of 2.5 m, though it rarely reaches this height under cultivation. Across West Africa, roselle is intercropped with other staple crops. While not among the primary food crops grown, it fills various spatial, temporal, ecological, dietary, medicinal, economic and cultural niches in the region’s farming systems and diets.

Roselle in the diet

First and foremost, roselle fills an important dietary niche as an ingredient in sauces. In rural Mali, green leaf sauces are an

important part of the daily diet of farmers and their families. Meat and fish are luxury items, enjoyed now and again or on special occasions. By and large, diets are carbohydrate heavy – the national dish *tò* is a congealed porridge made from maize or millet that is dipped in a watery sauce made of leaves or onions and dried mudfish (*manògò*). Leaf sauces are usually based on roselle, baobab (*Adansonia digitata*), amaranth (*Amaranthus* spp.) or bean leaves. In southern Mali, baobab trees are a communal resource and, therefore, the quantity one family is allowed to harvest is limited. A field crop such as roselle or amaranth, on the other hand, is individual property and families can harvest as much as they need.

Farmers begin to harvest roselle leaves for use in sauces six to eight weeks after planting. They usually harvest leaves two or three times during the five to six month growth cycle, as pruning increases the number of flowering shoots. Once the plant matures, the 3 - 6 cm long seed capsule, or calyx, is harvested. An average plant may yield between 1 - 1.4 kg of calyces. The *ruber* or “red roselle” is the most common variety and its calyces are readily available in local markets, but also the yellowish-green calyces of the *albus* or “white roselle” are used for sauces. Both in Mali and Senegal, red and white roselle are generally interspersed in the field, and then separated at harvest. In Senegal, average calyx yields are around 4600 kg/ha fresh weight, or 740 kg/ha dry. Researchers in Nigeria found that roselle yields were greatest when intercropped with legumes such as cowpea and peanuts.

In Senegal, white roselle calyces are cooked down to make a thick, sour sauce called *bèkèj*, served with the national dish, *céébu jën* (rice with fish). In rural areas, prior to harvesting, the calyx, both red and white roselle leaves and stems are sautéed in oil and served with *céébu wéx* (fried rice with vegetables). In Mali, roselle leaves are boiled down to make sauce for *tò*. Later in the season, white roselle calyces may be added to fish sauces eaten with rice or *tò*.

Roselle is rich in iron, phosphorus and calcium. The protein content of fresh calyces ranges from 1.5 - 3.5% and seed protein is nearly 17%. Fat concentration is between 1 - 2% and sugar content is high, around 12%. Roselle also has a number of medicinal uses. In Africa, India, and Mexico it is used to treat high blood pressure. Salves made from the herbage are used to heal sores and ulcers. Many of these medicinal uses can be attributed to the high concentrations of malic, ascorbic, and especially citric acids in roselle. Across southern Mali, people recognize its restorative powers. People say: “If you catch a cold, you should drink *da bilenni* to get better and it cleans the blood.”

Roselle as a crop

Roselle provides food throughout the latter half of the year, since farmers can harvest roselle for sauce both during its vegetative stage and at maturity. It matures after the end of the rainy season at a time when other important rainy season foods are becoming scarce and before cool season irrigated vegetables and amaranth become available. In many fields in both countries, roselle plants remain green for several weeks following the harvest of the primary field crops of peanuts, millet, beans or sorghum. By straddling the two cropping periods, it meets the need for green leaves for sauces at a time when other food crops are unavailable.

Roselle will also grow in places where other field crops are likely to do badly and farmers often plant it along field boundaries. Madame Ngom, a Wolof farmer interviewed in Thiawène, in the heart of Senegal's Peanut Basin, described a system of using roselle to divide 10 - 20 m strips of peanuts. Elsewhere in the village, long lines of roselle border fields of cowpea (*Vigna unguiculata*).

Farmers also grow it because it requires little attention. It grows vigorously, yet is rarely invasive. In Keur Banda, Ibrahim Niang grows roselle in clusters throughout his peanut fields. While he planted some of these plants intentionally, many are volunteer plants that he has left and allowed to grow. "When they come up by themselves, I just leave them alone!" Volunteer roselle is a common sight in most millet, sorghum, peanut, and cowpea fields in the Sudanian zone of West Africa. Farmers consider this "free food" - it requires no planting, labour or attention, apart from harvesting the leaves or calyces when needed. After the calyx and seed have been harvested, farmers sometimes collect the stalks and use their fibre to make ropes for tying thatch, fencing gardens and weaving fishing nets. Roselle yields as much as 1 - 1.5 tons of fibre per hectare dry weight.

Farmers in southern Mali also use roselle to demarcate field boundaries or sub-plots. In the village of Dialakoroba, farmer Birama Koné for example uses roselle to separate his sorghum field into a grid of 5 x 5 m. Within these squares, he plants peanuts between sorghum plants. He claims that his system of intercropping has improved his yields. "My father thinks it's bad, that it will reduce the yield, but I've had better yields than he has since I started planting things together." When asked where he learned to intercrop, he laughed and said, "I don't know, I just started experimenting."



Intercropping peanut and roselle under *Acacia albida*. Farmer Ibrahim Niang and technician Oury Diallo in Keur Banda, Senegal.



Photo: Author

Roselle leaves are used for many purposes.

He is not alone. Intercropping, particularly with roselle, is common throughout Mali. Another Dialakoroba farmer, Noumoutie Koné, intercroops peanuts both with clusters and rows of roselle. He has also integrated small hills of sweet potato (*Ipomoea batatas*) into his peanut fields. Typical of the parkland agroforestry practised throughout the Sahel, his fields lie in the middle of a small group of baobab trees. Other tree species integrated into the farming systems of southern Mali are *shea* (*Vitellaria paradoxa*), *nèrè* (*Parkia biglobosa*) and *jujube* (*Ziziphus mauritiana*) the fruits of which are important sources of energy in the Malian diet. In Senegal's Peanut Basin, baobabs and the nitrogen-fixing *Acacia albida* are commonplace in fields intercropped with roselle, peanuts and millet.

Such biological diversity is critical in the resource poor Sudanian zone. Indeed, intercropping is widespread across West Africa and practised on 80% of the farmland. On the degraded soils of the semi-arid savanna, where fertilizer use is both costly and inefficient, yields are mostly a function of rainfall. In times of drought, when cereal crops may fail, a diversity of crops in the farming system guarantees a minimum of food and financial security. Intercropping serves as a buffer against the extreme climatic variability of the Sahel, improving the resilience and stability of the region's agriculture. The numerous benefits of intercropping - including nitrogen-fixation, erosion control, moisture retention, weed control, and the reduction of soil surface temperature - give resource-poor farmers a good ecological alternative to costly inputs.

Not much is known about the interaction between roselle and other flora and fauna in this region. Its canopy is lower than that of a grain crop such as millet and higher than legumes such as beans or peanuts. Research has revealed that diverse crop canopy heights attract beneficial insects - which help control pests - and it is possible that roselle's sticky calyces may contribute to this. Its growth may benefit from the so-called "edge effect" when planted on a field's boundary. At the field edge, a crop receives more light and is not shaded by any companion crop on the outer side. As it is a different species from the crop grown in the field, it is not competing for the same nutrients at the same time. Because it does not grow very high, it

will not compete with other crops for light. It may also act as a physical barrier slowing the spread of weeds, pests and pathogens.

Generating income

For African women, access to land and labour are often factors that limit their farming activities. However, since roselle can be farmed along the boundary of a field, a husband will often allow his wife to use what would otherwise be wasted space. For women farming in urban, peri-urban, and rural areas with regular access to markets, the economic benefits of roselle production are considerable. Huge quantities are sold at markets throughout Senegal and Mali. Women and girls generally benefit from these sales, since they are often the ones growing the crop. More importantly, however, the sale of value-added



Roselle intercropped with cowpea. Farmer Ibra Diop in Thiawene, Senegal.

Photo: Author

and juice in the markets of both countries shows it plays a significant role.

With a changing global economy demanding specialization for agricultural exports, male and female farmers alike will be pushed towards export cash cropping. There is potential for roselle in this market too, but unlike the cotton grown in this part of West Africa, roselle can also be consumed for subsistence and sold locally. As cotton prices continue to fall, several Malian farmers interviewed in Dialakoroba have reduced their area of cotton to increase their cultivation of other cash and food crops such as roselle. Fluctuations in peanut prices in Senegal have led farmers, interviewed in several Peanut Basin villages, to intensify production of secondary crops such as roselle.

Roselle's rich red colour has led to its widespread use in Europe as a natural colouring agent in foods. The nutritional content and its medicinal properties have also brought it to the attention of Western consumers. Europe is the largest importer of roselle, with Germany importing 80% or 3000 tons annually, at US\$2500 a ton. Sudan, Mexico and Egypt are major exporters of roselle.

In conclusion, the little red and green calyces and leaves of roselle fill several important agroecological, economic, and dietary niches in the food and farming systems of Senegal and Mali. Roselle's role, while understated and subtle, has widespread implications for farmers like Birama Koné and Ibrahim Niang. Women farmers like Madame Ngom, in particular, profit from roselle sales in local markets across West Africa. While some of these niches could be filled by other crops, roselle's prominence in the cultural and food traditions of several West African societies is irreplaceable. Roselle's integral role in the farming systems of the Sahelian sub-region of West Africa may be used as a model for intercropping projects in tropical farming systems elsewhere in the world, providing both food and fibre to farmers, while improving crop diversity and filling ecological and economic niches in both cash and subsistence agriculture. By promoting the use of this underutilized species, extension workers can help diversify farming systems throughout the tropics, thereby increasing food and economic security on marginal lands.

roselle products such as *da bilenni* (juice/syrup) provides revenue that is directly controlled by women. Food preparation is culturally a woman's domain, so many women are able to earn money by cooking and selling foods on market days - bean fritters, fried plantains or boiled cassava, among others. Roselle juice and syrup sales play an important part in these small-scale trading activities. Red roselle calyces are boiled in water for several hours to extract the dark red colour, often at a ratio of 1 kg of calyces to 5 litres of water and large amounts of sugar are added to reduce the sour flavour. Women and girls then sell the concentrate in recycled spring water bottles. To make *da bilenni*, they water down the syrup, sometimes mixing in mint or ginger, and refrigerate or freeze it in small plastic sacks. A French study estimated that one person could produce about 300 litres per day, using 1 kg of roselle for each 80 litres of *da bilenni*. While the actual economic importance of roselle to the livelihoods of Malian and Senegalese women has yet to be quantified, the high visibility of women selling roselle calyces

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Additional online resources

<http://www.herbs.org/africa/hibiscus.html>