

Nutritious underutilized species



Amaranth
(*Amaranthus cruentus* L.)

Botanical framework

Family: Amaranthaceae

Subfamily: Amaranthoideae

Genus: *Amaranthus*

Scientific name: *Amaranthus cruentus* L.

Common names

Amaranth, purple amaranth, pigweed, alegría, red amaranth, blood amaranth, kiwicha, huautli, caterpillar amaranth, amarante rouge, Rispenfuchsschwanz, mchicha, bayam, bledo, bredo, kullitis, African spinach, prince's feather, mexican grain amaranth, amaranto cruento, Indian spinach.

Brief introduction to the species

Amaranthus collectively known as amaranth, comprises about 70 species, of which about 40 are native to the Americas. It includes at least 17 species with edible leaves and three grain amaranths. *Amaranthus cruentus* belongs to both categories. The two species of grain amaranth most commonly grown are *Amaranthus cruentus* and *Amaranthus hypochondriacus*. Because of its importance as a symbol of indigenous culture, and because it is very palatable, easy to cook, and its protein particularly well suited to human nutritional needs, interest in grain amaranth was revived in the 1970s. It was recovered in Mexico from wild varieties and is now commercially cultivated.

Although several species are often considered weeds, people around the world value amaranths as leaf vegetables, cereals and ornamentals.

Main use and benefits

How is it generally consumed?

The main uses of *Amaranthus* are as leaf vegetable and grain and can be also used as forage.

The seeds are eaten as a cereal grain. They are black in the wild plant, and white in the domesticated form. They are ground into flour, popped like popcorn, cooked into a porridge, and made into a confectionery called 'alegría'.

What are neglected and underutilized species?

The term 'NUS' – standing for neglected and underutilized species – refers to a category of non-commodity cultivated and wild species, which are part of a large agrobiodiversity portfolio today falling into disuse for a variety of agronomic, genetic, economic, social and cultural factors. NUS are traditionally grown by farmers in their centres of diversity, where they support nutrition security and other livelihood goals of local communities while contributing to meet their socio-cultural needs and traditional uses. Until recently these species have been largely ignored by research and development, becoming less competitive than well established major crops and losing gradually their diversity and associated traditional knowledge.

The leaves can be cooked like spinach, and the seeds can be germinated into nutritious sprouts. The leaves and tender stems are cut and cooked or sometimes fried in oil, and mixed with meat, fish, cucurbit seeds, groundnut or palm oil. Dishes with amaranth are eaten with the main dish of cereals or tubers. Traditionally in arid regions, the leaves are dried and the leaf powder is used in sauces during the dry season.

Nutritional value

What is its nutritional value?

Plants constitute an alternative source of proteins in the human diet, with advantages over animal proteins because of their low content of saturated fats and absence of cholesterol. Amaranth leaves have a high content of essential micronutrients. They are a very good source of vitamins including vitamin A, vitamin K, vitamin B6, vitamin C, riboflavin, and folate, and dietary minerals including calcium, iron, magnesium, phosphorus, potassium, zinc, copper, and specially manganese. One cup of amaranth leaves, that are cooked, boiled, and drained contain 73% of vitamin A daily value requirement, 90% vitamin C, 28% calcium and 17% iron. The leaves are not as rich in protein, as they only contain 2.8 g of protein.

The seeds are also nutrient-rich. One cup of boiled amaranth seeds provides 5.2 g of fiber (women require 21-25 g/day; men require 30 to 38 g/day). It is somewhat rich in zinc (2 mg/ cup) meeting a quarter of the 8 mg of zinc needed per day for women. A cup of boiled amaranth contains 5 mg of iron (18 mg is the requirement for women; 8 mg for men per day). Amaranth is not a vitamin-rich food because it supplies only trace amounts of B vitamins and vitamin E. The only notable vitamin present in boiled amaranth is folate. One cup of boiled amaranth supplies you with 54 mcg of the required 400 mcg needed per day. Amaranth carries 9.3 g of protein however, it is an incomplete protein. To get full benefit from its protein load, you must also eat a complementary protein source to ensure that all essential amino acids are consumed.

Growing and harvesting

How easy is it to grow? How is it harvested?

The crop is drought-tolerant, provided there is sufficient moisture during the early growing period. Frost plays an important role in the harvest of the crop. Since amaranth is an annual crop native to the southern latitudes of North America, it does not mature completely where the growing season is short. A frost is necessary to terminate the crop's growth so that the plant material will be dry enough to harvest.

In practice harvesting is done at a young stage to obtain a more tender product. Most commercial amaranth growers harvest the whole crop by uprooting 20-30 days after

transplanting. Some growers harvest by cutting at ground level. If wide spacing is practised, the harvest method is by repeated cuttings, the first cutting about one month after transplanting, and then every 2-3 weeks for a period of one to two months.

Productivity

How much will it produce?

The seed yield of vegetable amaranths is up to 2 t/ha, of grain types up to 5 t/ha. Forage yields of 30 t/ha (with 18% dry matter content) in 8 weeks have been reported, representing a yield of 1.6 t/ha of pure leaf protein of excellent quality.

Preserving and processing

Can it be preserved, keeping its value?

Leafy vegetables are highly perishable food items and require special processing treatments to prevent post harvest losses. Indigenous vegetables like amaranth are not easily preserved by either canning or freezing and be kept for longer periods. The following preservation methods are commonly used: sun-drying of samples without any pre-treatment; blanching and sun-drying; and blanching then freezing. Blanching and then sun-drying of amaranth could be the best method of preserving it without compromising on its quality.



Amaranth is cleaned with screens, by winnowing, with a fan or other blowing device. After harvesting, it is important to further dry the crop to ensure it will not mold in storage. It can be left on trays in the hot sun or placed near an indoor heat source. Unlike beans or true grains, amaranth has no hulls to remove.

Other uses

What else can be done with it?

Forms with large bright red inflorescences are widely grown as ornamentals. A red dye can be obtained from the inflorescences. It is sometimes used as fodder, but only as a moderate part of the daily portion since this use is limited by the high calcium oxalate content. Several studies have shown that amaranth seed or oil may benefit those with hypertension and cardiovascular disease; regular consumption reduces blood pressure and cholesterol levels, while improving antioxidant status and some immune parameters.

In traditional medicine amaranth is especially recommended for people with a low red blood cell count. In Benin the dried plants are burned for the preparation of potash. Vegetable amaranths are recommended as a good food with medicinal properties for young children, lactating mothers and for patients with constipation, fever, haemorrhage, anaemia or kidney complaints. Amaranth is rather diuretic. In Senegal the roots are boiled with honey as a laxative for infants. In Ghana the water of macerated plants is used as a wash to treat pains in the limbs. In Ethiopia *Amaranthus cruentus* is used as a tapeworm-expellant. In Sudan the ash from the stems is used as a wound dressing. In Gabon heated leaves were used on tumours.

Culture

Are there any specific taboos, specific cultural adaptations, historical perspective?

It was supposed to have special healing properties, and as a symbol of immortality was used to decorate images of the gods and tombs. In legend, Amaranthus (a form of *Amaranthus*) was a hunter of Artemis and king of Euboea; in a village of Amaranthus, of which he was the eponymous hero. It was also widely used by the Chinese for its healing chemicals, curing illnesses such as infections, rashes, and migraines.

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