Annual Underutilized Crops

ECHO Inc.

Edible nutritious seeds and leaves from amaranth (*Amaranthus spp*)

Amaranth is a versatile plant, with edible nutritious seeds and leaves. It is more drought tolerant than wheat or maize. Amaranth plants are well adapted to growing at higher temperatures, in bright sunlight, and in dry conditions. (It is a C-4 plant, for those of you who have studied botany). Amaranth is harmed by frost. It grows best between 21 to 28ºC, but can go as high as 35 to 40ºC.The highly nutritious amaranth seeds were a staple in the diet of the Aztec Indians in Central America.



Although the seeds are hardly bigger than poppy seeds, they occur in very large quantities, around 100,000 per plant. They contain protein that is nearly perfectly balanced for the human diet. The protein content is 13 to 18%, containing high levels of the essential amino acid lysine. Seeds also have high levels of calcium, iron, phosphorous, potassium, zinc, vitamin E, and vitamin B-complex. The fiber is very soft and fine, especially in comparison with wheat and other common grains, so it is not necessary to separate it from flour. Seeds are ground for porridge or flour; they may also be toasted, popped, flaked, or sprouted to use in cooking and baking.

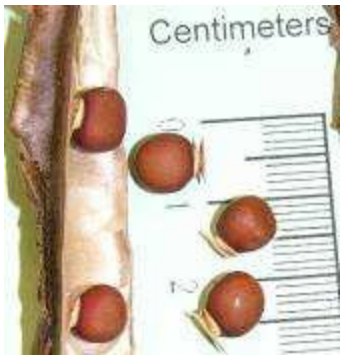
Globally, amaranth leaves are probably more widely eaten than the seeds. Leaves of any amaranth can be eaten (boil and discard the cooking water to remove oxalates), but those selected for vegetable use are more suitable for cooked greens. Vegetable types will not give enough seed to be used for grain. Flexible stems up to thumb size can also be peeled, cooked and eaten like asparagus. Amaranth plants may also be used as a forage crop.

ECHO distributes several species and varieties of grain and vegetable amaranth. Check the seed listing on our website for descriptions of these. EDN 91-1; AZ 75; also a TN.



Winged bean *(Psophocarpus tetragonolobus)*

The winged bean has potential to be a perennial, though at ECHO root knot nematodes are such a serious pest that we grow it as an annual. Winged bean produces edible leaves that can be cooked like spinach, edible pods that can be cooked like green beans if harvested when still green and flexible, edible dry beans that should be harvested after pods are brown and dry, and edible blossoms that can be eaten raw or fried. Some varieties will produce edible tubers (e.g. Square and a day-neutral variety) when the plants are older. The tubers have up to 10 times the protein of a potato. Winged bean plants can be difficult to get started, but become quite prolific after a couple of months. Most varieties will not produce blossoms until days are quite short. ECHO has special “day-neutral” varieties, however, that will produce regardless of day length. Winged bean is grown on a trellis, as the plant is a vigorous vine. Winged bean is a highlight on tours, and important for overseas visitors. ECHO’s collection is larger than perhaps any other in the USA. More information can be found in AZ 270; 277 (cooking information); EDN 83-8; EDN 97-6 and our on-line seed catalog.



Celosia (*Celosia argentea*)

Also called Lagos spinach or Quail grass, is a lowmaintenance leafy vegetable that is easy to plant, grows in most climates and soils, withstands drought and heat, and has few problems with pests and disease. It is easy to prepare, highly nutritious and tastes good. The plant has attractive flowers. Note that it also produces large quantities of seed, which can make it a pest. EDN 94-6 (expanded in a TN); AZ 65.



Quinoa (*Chenopodium quinoa*).

Seeds from quinoa are a popular, nutritious food that is grown at high altitudes in the Andes Mountains in South America. The seed has an exceptional balance of protein (16-23%), amino acids, fat, oil, and starch. It is a good complement to cereals (that are deficient in lysine) and legumes (that are deficient in methionine and cystine). In fact, quinoa is very close to the FAO standard for human nutrition requirement of protein. Quinoa seeds are traditionally toasted or ground into flour,

although they may also be boiled and used like rice. Most varieties must be milled or washed well in cold water to remove bitter saponins from the seed coat. Quinoa leaves are also edible and nutritious. AZ 78; EDN 52-5.

Yard long Bean (*Vigna unguiculata ssp sesquipedalis*).

As the name suggests, the pods on this bean plant are very, very long! You only need a few in order to make a meal. The pods are best eaten when they are young, before the seeds cause the pod to bulge. This species is much more tolerant of heat and humidity than the green bean, Phaseolus spp. EDN 60-5.



Uberlandia carrot (*Daucus carota*).

Now farmers can save their own carrot seed, even in the tropics. Carrots are a popular crop in most countries, but some farmers cannot count on being able to purchase seed each year. Commercial varieties of carrot only set seed if the roots remain in the ground over a cold winter. The Uberlandia variety flowers soon after the roots mature, and then sets seed. A side benefit is that the flowers provide food for tiny wasps that prey upon insect pests. Quality of the roots is not as good as commercial varieties, but we have simple instructions on how to develop your own

variety over a few years. We also have a cross between a commercial carrot and Uberlandia that has higher quality and still sets seed in the tropics. You might want to try both. AZ 54 and EDN 74-7.

Underutilized species and varieties of fruit trees.

An often overlooked way to bring a blessing to smallholder farmers is to introduce them to new fruit tree species or new varieties of species they already grow, and to teach how to propagate superior varieties by grafting. In most countries there are many fruit species and varieties that could quite possibly thrive and be popular, but neither farmers nor development workers have heard of them. Others know of these trees but do not know how to obtain and evaluate the trees. The special EDN 100 section of ECHO's website has links to information about many great fruit trees that you may not have considered. Those that grow well from seed and are in our seed bank are so indicated.

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