

Growing Amaranth and Quinoa

There are so many similarities between quinoa (keen' wah) and amaranth that it seems appropriate to describe them together. Quinoa, however, is a cool weather crop and amaranth is a warm weather one.

Quinoa and amaranth are two very old, high-protein plants that hail from South America. They were held sacred in ancient Inca and Aztec cultures. Both now hold great potential for self-sustaining gardens in the northern hemisphere. They grow as easily as their weedy relatives (pigweed or lamb's-quarters) and the quality of food they offer far surpasses that of our common grains. Traditional hand-harvesting methods can obtain bounteous harvests.

Quinoa and amaranth are treated as grains although they have broad leaves, unlike the true grains and corn, which are grasses. Their leaves are among the most nutritious of vegetable greens, but it is their fruit that is usually meant when these plants are referred to as "crops." And that fruit or grain is quite special. The protein content of these two foods has an essential amino acid balance that is near the ideal. They both come closer to meeting the genuine protein requirements of the human body than either cow's milk or soybeans. They are high in the amino acid lysine, which is lacking in most cereals such as wheat, sorghum, corn and barley.

Both quinoa and amaranth are quite adaptable, disease-free and drought-tolerant plants. They thrive in rich soil - as long as it is well drained - but both will, once established, produce abundant harvests under dry conditions.

The wild relatives of both amaranth and quinoa have long been familiar to North American gardeners and are often called by the same name of pigweed. The pigweed that is related to quinoa is also called lamb's-quarters (*Chenopodium album*), while the ancestor of amaranth is known as red-rooted pigweed or wild amaranth (*Amaranthus retroflexus*). Both pigweeds have the amazing ability to flower and go to seed at any stage of their growth and both will cross with their cultivated progeny. The grower who wants pure strains of either quinoa or amaranth must therefore pay close attention to weeds.

Most cultivars of amaranth and quinoa grow four- to eight-feet high and, when in flower, are majestic plants whose presence emits a special radiance in any garden. Quinoa's unique flower hues are most striking at a close distance around dawn or dusk, while amaranth's flamboyant bronze and burgundy tones are dazzling in bright sunshine. Smaller ornamental amaranths such as Love-Lies-Bleeding and Prince's-Feather have been listed in garden catalogues for hundreds of years.

Soil Preference. Quinoa and amaranth are responsive to nitrogen and phosphorous. Plants grown in average garden soil will be four-feet to six-feet tall, while those grown in rich soil or compost may reach over eight feet. Optimum soil is a well-drained loam but both plants will do well in all but poorly aerated clay soils.

Varieties. Named varieties of amaranth and quinoa are increasingly available from seed companies. Most North Americans would be hard-pressed to describe the subtle differences in flavour between cultivars. Black-seeded varieties of amaranth stay quite gritty when cooked, so it is best to use these varieties just for their leaves. All the golden and light-colored amaranths I've tried are excellent cooked as whole grains and all have delectable greens.

Planting Times. Quinoa grows best where maximum temperatures do not exceed 90°F (32°C) and nighttime temperatures are cool. For most southern Canadian and northern U.S. sites, the best time to plant quinoa is late April to late May. When soil temperatures are around 60°F (15°C) seedlings emerge within three to four days. However, when quinoa seeds are planted in soil with night-time

temperatures much above that, quinoa, like spinach, may not germinate. In this instance, it's best to refrigerate seeds before planting.

Amaranth is a warm season crop that requires full sun. Best germination occurs when soil temperatures range from 65 to 75°F (18-24°C). For southern Canada and the northern U.S., this usually means a late May or early June planting.

Sowing. The small seeds of amaranth and quinoa will germinate more successfully with a finely prepared surface and adequate moisture. Seeds should be sown no more than one-quarter inch deep in rows one and a half- to two-feet (45-60 cm) apart or wide enough to accommodate a rototiller between the rows without damaging the plants. Planting can be done by hand or with a row seeder. Plants should eventually be thinned 6 to 18 inches (15-45 cm) apart. (Thinnings make great additions to salad.)

One gram of seed will sow 50 feet (15 m) of row. An acre requires about one pound of seed.

Maintenance. Quinoa resembles lamb's-quarters and amaranth resembles red-rooted pigweed, especially in the early stages of growth, so it is best to sow seed in rows to make weeding less confusing. Sowing amaranth cultivars with purple leaves also simplifies weeding. Since seed is small, you can avoid considerable thinning by mixing it with sand or radish seed before sowing, as is sometimes done with carrots. Amaranth and quinoa are low-maintenance crops but weeds, especially at the beginning, should be discouraged by cultivation or mulching.

Soil moisture is probably sufficient until early June to germinate the seed. Given good soil moisture, don't water until the plants reach the two- or three-leaf stage. Quinoa and amaranth appear slow growing at first but both are extremely drought tolerant and do well on a total of 10 inches (25 cm) of water or less. As the plants reach about one foot in height, they start to grow very rapidly, the canopy closes in, weeds are shaded out and less moisture is lost through evaporation.

You may have noticed occasional lamb's-quarter or amaranth weeds succumbing to munching by insect larvae in the flowerheads and the same is sometimes true of their cultivated cousins. This won't have any serious impact on the harvest.

Harvesting. Quinoa is ready to harvest when the leaves have fallen, leaving just the dried seedheads. Seeds can be easily stripped upwards off the stalk with a gloved hand. Quinoa resists light frosts especially if the soil is dry. So long as maturing seed is past the green stage, frost will cause little damage and harvesting can be done a day or two later. Extreme hot weather and warm nights inhibit fruit set. It is important to watch the weather when quinoa is ready to be harvested: if rained on, the dry seed can germinate. If the heads are not completely dry, harvest them when you can barely indent the seeds with your thumbnail. They should then be thoroughly dried before storage.

Amaranth keeps on flowering until hit by the first hard frost. Seed will often ripen many weeks before that, usually after about three months. The best way to determine if seed is harvestable is to gently but briskly shake or rub the flower heads between your hands and see if the seeds fall readily. (Numerous small and appreciative birds may give hints as to when to start doing this.) An easy way to gather ripe grain is, in dry weather, to bend the plants over a bucket and rub the seedheads between your hands. My own preferred threshing method is to rub the flowerheads through screening into a wheelbarrow and then to blow away the finer chaff using my air compressor. Cutting and hanging plants to dry indoors does not work very well: the plants become extremely bristly and it is difficult to separate the seed from the chaff.

The best time to harvest amaranth commercially is in dry weather three to seven days after first frost - a condition not easily met in many places. Most presently available varieties maintain too high a

moisture content to be harvested mechanically before a killing frost.

Clean quinoa and amaranth with screens, by winnowing, with a fan or other blowing device. After harvesting, it is important to further dry your crop to ensure it won't mold in storage. It can be left on trays in the hot sun or placed near an indoor heat source. Stir occasionally until it is as dry as possible. Store seed in air-tight containers in a cool dry place.

Threshing. Unlike beans or true grains, quinoa and amaranth have no hulls to remove. However, quinoa is covered with a bitter substance called saponin, which birds and deer won't touch. Because of this coating, quinoa requires thorough rinsing before cooking. One method is to put the grain in a blender with cool water at lowest speed, changing the water until it is no longer soapy. It takes about five water changes to achieve the desired, non-frothy result. Another way is to tie the desired amount of quinoa in a stocking, a loose weave muslin bag, or a pillowcase and to run it through a cold water cycle of an automatic washing machine. You can also get away with less or no rinsing by mixing quinoa with other grains or pulses, rendering the saponin hardly noticeable.

Commercial quinoa has had the saponin removed.

Amaranth has no saponin and no hulls, so can be cooked without additional preparation.

Yields. An ounce or two of seed per plant is common but you can easily get over six ounces per plant grown in your best compost. Normal commercial yields for amaranth and quinoa are 1200 to 2000 pounds (500-900 kg) per acre. Agricultural combines are still being adapted to the lightness of the seed, and full harvest potential is yet to be realized. Much higher results are obtained from labour-intensive harvesting: yields of over 5,000 pounds per acre have been reported from Central and South America.

Cooking. Basic recipe: Bring equal volumes of amaranth/quinoa and water to a boil, reduce to a simmer, cover, and cook until all water is absorbed. Amaranth takes about 10-12 minutes and quinoa 12-15 minutes. For a more porridge-like consistency, use a greater proportion of water. Experiment to find the texture you prefer.

Quinoa and amaranth both contain about 16 percent protein, E and B vitamins, calcium, iron and phosphorous. They are easy to digest and have wonderful flavour. Their simple distinctive taste gives them great versatility for cooking purposes. They can be substituted for other grains in many recipes, though they are much more filling. Because they are not true cereal grains, they can be eaten by people who suffer from cereal grain allergies.

Young quinoa and amaranth greens make tasty salad material and are high in vitamins (especially calcium and iron), minerals and protein. Carrots juiced with a small amount of either leaves make a most invigorating drink.

Older greens are wonderful steamed, stir-fried or incorporated into curries or casseroles. Some varieties have better greens than others and are usually so indicated in seed catalogues. One of the tastiest amaranths grown for greens is called Tampala. Amaranth is also called Chinese Spinach because of its popularity as a green vegetable in that country.

Amaranth seed is often ground into flour; it contains more gluten than that of quinoa and combines well with traditional flours in the ratio of one part amaranth to four parts other grains.

Saving Your Own Seed. Amaranth and quinoa cross with their wild relatives, so it is important to weed out red-rooted pigweed and lamb's-quarters if you want to maintain pure seed. Amaranth cultivars will cross with each other as will quinoa cultivars, so grow only one kind of each or separate

cultivars by as much distance as you can. Certain varieties, such as purple-leaved amaranth, are easier to select for than others. Lamb's-quarters has a greater branching habit than quinoa and smaller flowerheads.

Outlook. Quinoa and amaranth have exciting possibilities for the home gardener looking for hardy, easy-to-grow, high-protein foods. They have higher food quality than our common grains such as wheat and oats, and they don't have hulls that need to be removed by machinery prior to cooking. Instructions on most commercial packaging to cook these grains for 30 minutes might be hampering their popularization: 15 minutes simmering is long enough to provide soft but non-mushy grain. From my own success with growing amaranth and quinoa over many years, I would say that the difficulties in cultivating and preparing these two grains are relatively minor and that the pleasures obtained in growing and eating them are definitely major.

Salt Spring Seeds' Varieties. For both quinoa and amaranth I've tried to maintain a good land race mix rather than focussing on varietal differences. This has been because I haven't noticed significant flavour differences in the cultivars that grow the best here. Multi-hued Quinoa has unique flower tones of mauve, purple, red, orange, green and yellow. They are not flamboyant but have a subtle brilliance: they need to be absorbed for a while, especially in morning or evening light, to be fully appreciated. Amaranth Mix has spectacular flowering heads of purple, red, bronze, gold and green. Purple Amaranth has purple leaves and deep burgundy flowers.