



Amaranth: The ideal crop to add to a small farmer's polyculture in developing nations?

New Farm's roving reporter, while traveling in Guatemala, revives the case for an all-but-lost grain that was literally once the food of the gods. Amaranth, he says, is rich in protein, calcium, iron, vitamin E and lysine--nutrients sorely lacking in the diets of the rural poor in countries like Guatemala.

By Don Lotter
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In 1977, I was involved with a project in which we introduced grain amaranth to a dozen highland Mayan farmers in San Juan Comalapa, Guatemala. Twenty-eight years later—on a recent trip back to Guatemala to visit the Catu family, with whom I lived back then—there was no sign of the amaranth. There was, however, another “food” new to my host family—Pepsi. Everything else for the special “guest” meal—the tortillas, beans, greens, a little beef—was the same as before. I’ve been told that Pepsi carried out a massive advertising campaign in rural areas. Why Pepsi and not Coke? “We’re a Pepsi family,” they proclaimed in testament to the effectiveness and pervasiveness of the ad campaign.

The good news is that the soda pop ritual only happens about twice a month; on special occasions, they buy two liters for 24 people. I can give them that. I just wish we had the type of promotional power and funding for foods like amaranth that the soda pop and beer companies have.

I had known since the 1970s that amaranth grain was considered an excellent food because of its complement of amino acids. But upon reexamining amaranth's nutritional data (some of it recently published), plus having just finished off a bag of *atole de amaranto*, a good-tasting, amaranth-based powder for making the hot drink *atole*, I'm newly astonished—both by amaranth's super-nutritional qualities and its continued obscurity. Amaranth is a truly remarkable food. As one U.S. food industry person (admittedly from a company that develops and markets amaranth) put it: “Amaranth is positioned in today's marketplace like soybeans were 50 years ago.” I now realize why.

Amaranth enjoys a protein content of a remarkable 16 percent and is two to three times higher in lysine than most other grains. In fact, this important amino acid is low in most other grains and is perennially deficient in the diets of the rural poor in countries such as Guatemala. Amaranth is also 4 to 8 times higher in calcium and 3 to 5 times higher in iron—both critical elements for nutrition—than other common grains such as corn, wheat, and rice. In fact, when rated by nutritionists for general nutritional quality, amaranth scores significantly higher than other common foods such as milk, soy, wheat and corn. Amaranth's digestibility score is an impressive 90 percent, much higher than problematic foods such as soy, milk and wheat.

Amaranth seeds contain 5 percent to 9 percent high-quality oil, again, much higher than the common grains. Found in the amaranth oil are tocotrienols—a relatively rare and very beneficial form of vitamin E—and squalene, another rare compound reported to have anti-cancer properties.

Amaranth is not a new crop here, or more accurately it can be said to be both old and new. Cultivated extensively by the ancient Mayas and Aztecs, amaranth was so important to the latter culture that they used it as a medium for subjugated tribes to pay tribute. It is estimated that some 20,000 tons per year of amaranth were brought to the ancient Mexican city Tenochtitlan from the 17 surrounding provinces, where it was used as a food associated with religious days. It was this association with the Aztec and Mayan religions that prompted the Spanish rulers to banish the crop

from its Mesoamerican empire. Since then it has mostly disappeared from Central America.

In Mexico, grain amaranth production has hung on until today, but as a relatively minor non-staple; it is the basis of a sweet cookie-like condiment called *alegria*, in which popped amaranth is mixed with sugar syrup and honey.

Other countries such as India, Nepal, China, and the U.S. have done work on grain amaranth. In the U.S., The Rodale Institute (publisher of *New Farm*) has done the most work on amaranth, mostly in the 1970s. Several varieties that have been used in the U.S. were released by The Rodale Institute (TRI). TRI's work on the crop was discontinued in the 1980s.

In countries such as Guatemala, where more than 50 percent of the population lives in poverty (World Bank, 2004), malnutrition is rampant, and infant mortality is still high, amaranth, as the primary ingredient in a formula, can replace the "modern" nutritional formulas developed over the years in attempt to bolster rural people's nutrition. An article in the *Journal of Food Science* concluded that amaranth grain could be the basis of infant formula because of its combination of high digestibility and nutritional quality.

Combine these nutritional pluses with the fact that amaranth is a hardy, drought-resistant plant, and you have a crop with great potential for incorporation into developing (as well as developed) country diets.

My trip to visit a smallholder farm where amaranth is being reintroduced as a potential grain crop took me into the hinterlands of a region of Guatemala that is considered to be "food insecure" (food security is the going word these days in agricultural development circles). Totonicapán, a Mayan Quechua speaking area, is one of the poorest regions in Central America, with more than 50 percent of the population categorized by the World Bank as "extremely poor." (There are three main categories: non-poor, poor [as mentioned above, this category characterizes 50 percent of Guatemalan population], and extremely poor. The extremely poor have serious malnutrition, health, and infant mortality problems.)

I was struck by the percentage of land that is badly eroded, to the point that bedrock shows and no crops can be grown (except perhaps vetiver grass, another remarkable plant. Vetiver will not only grow on these sites, it will regenerate the topsoil by stopping runoff in its tracks.) An even higher percentage of the cropland was down to gravel and sand, and a mid-season drought had turned the corn crop on these soils into shriveled, yellow, stunted plants that would yield little or nothing. About half the land had good soil, and the crops looked alright.

It was in one of these eroded, gravel-strewn parcels of cropland where the corn had completely failed that we found a thriving crop of amaranth. Though the number of amaranth plants that had been cultivated was small, the health of the crop—with its robust, red inflorescences—was impressive. Amaranth's reputation for drought resistance, while not well documented (though some data exists) seems to be well-founded.

Amaranth is one of the few dicotyledonous plants that has what is known as the C4 metabolism, a much more efficient form of photosynthesis than the more-common C3 and linked to proficient production and drought resistance. Most of the world's C4 crops—corn, sorghum, sugar cane, millet—are from the grass family.

The Spanish NGO (non-governmental organization) Intervida is currently the main entity promoting amaranth for small farm production in Guatemala. Intervida's headquarters just outside Quetzaltenango resemble a college campus. There, two fulltime Guatemalan extension agents who work on amaranth; Roberto Miranda focuses on amaranth agronomy and the dissemination of seed, and Gladys Castillo works on the equally important aspect of the domestic processing and preparation of amaranth, an area often left out of food-crop development projects.

The farmer-collaborator, Santos Modesto, is a smallholder farmer near the village of Xecajá. Santos had sown amaranth in his *milpa*, a traditional corn-bean-squash polyculture. In the plot that still had good soil, the corn plants (a local variety) were about 2 meters tall; shorter than usual because of the mid-season drought, but nevertheless yielding adequately. Modesto had cultivated amaranth plants, from seed provided by Roberto, at a ratio of approximately two or three corn plants to one amaranth. This type of mix is the way in which many farmers here do things. Roberto said that there were other collaborators who had sown the amaranth in small monoculture plots.

Grain amaranth is an ideal crop for small farmers. Since it is small seeded (about a millimeter in diameter—slightly larger than poppy seed— and off-white colored), farmers can spread the seed liberally and then harvest them young for pot herbs when they are 20cm to 30cm high, leaving

adequately spaced plants for grain production. The grain amaranth plants commonly reach two meters in height.

In traditional markets all over Mexico and Central America, bundles of baby weed amaranth known as *bledo* (which grows liberally in farmers' fields) are sold as pot herbs. The same weed, known as pigweed, grows all over North America where soils are disturbed in the spring (i.e., virtually all gardens and farm fields). Vegetable amaranth has been rated as equal or superior to spinach in taste and has substantially more calcium, iron and phosphorus. The baby forms of grain amaranth are equally as good as pot herbs.

Most of the amaranth grain varieties are *Amaranthus hypochondriacus*, with some varieties coming from *A. cruentus* and *A. caudatus*. Vegetable amaranth varieties were developed in the 1970s from *A. tricolor*, *A. lividus*, and *A. creuntus*. Amaranths are some of the worst weeds in the world. All are black seeded, the most common being *A. retroflexus*.


Harvesting grain amaranth requires more labor than harvesting corn but no more than harvesting beans. After seed filling, the amaranth inflorescence is cut from the plant, taken to the home compound, and dried over a plastic tarp, which catches the seeds.

According to Roberto Miranda, the grain amaranths they have tested have yielded the equivalent of 3,600 kg/ha. This is consistent with trials in the U.S., where amaranth yields have ranged from 1,500 to 6,000 kg/ha.

Intervida packages a product, called Amarantole—made from the flour of toasted amaranth, corn and rice, with added cinnamon—for making *atole*, the porridge-like, sweetened beverage that is a favorite hot drink here. The agency also has extension workers in the field teaching women how to prepare the amaranth by gently toasting it, grinding it on their stone grinders, and blending it into tortillas or into their traditional *atole* recipes.

Progress is, of course, slow in trying to get people to put something new into their food routines, even when it tastes good and can significantly improve their nutritional status; that is, unless they are subject to massive advertising campaigns—a la Pepsi—or perceive it as being able to make them “modern.” (These caveats don’t just apply to the people of developing countries; American culture is rife with such examples.)

“We are in Guatemala for the long run,” says Intervida’s Luis Nuñez.

I finished off the package of Amarantole that was given to me by Intervida and want more. Today I searched the market in vain for amaranth seed, *semilla de bledo*, in order to make my own. 

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>SIDEBAR<

How to make Amarantole:

Needed:

coffee grinder or grain grinder (or amaranth flour and ground toasted sesame)

amaranth grain

toasted sesame seed

butter

honey

cinnamon

Lightly toast the amaranth seed and (if needed) the sesame seed.

Fill the coffee grinder up to the blades with amaranth seed and grind to flour. Do this a second time, but with a tablespoon of toasted sesame seed added.

Add a dash of cinnamon.

Whisk the amaranth-sesame flour mix into 2-3 cups of cold water and bring it to a boil. Add a slice of butter. Let it cool a little. Add a dollop of honey, and enjoy a delicious and nutritious hot beverage!

