A Perspective On Nutritional Limitations Of Amaranth

ECHO Inc.

We featured amaranth in the last issue, but mentioned that we were looking into some apparent nutritional problems in more detail. Our Technical Note A-1, "Grain and Vegetable Amaranth" is now ready. It deals with general characteristics, nutritional value, cultivation and preparation for both grain and vegetable types and is available free upon request. I am including most of the nutritional section here, however, because it is important to balance the unbridled enthusiasm of much of the promotion of amaranth.

There is no doubt, based on the content of nutrients, that amaranth seed and leaves are exceptionally nutritious. Amounts of vitamin C, iron, carotene, calcium, folic acid and protein are especially high in the leaves. There are reports that the incidence of blindness in children due to poor nutrition has been reduced with the use of 50 to 100 g of amaranth leaves per day. On a dry weight basis, the protein content of the leaves is about 30%. Amaranth seeds have more protein than many grains (15%) and this protein is high in the amino acid lysine that is usually low in cereals, and sulfur-containing amino acids that are usually low in legumes. Based only on an analysis of those nutrients that are present, amaranth would seem to be almost a "miracle food."

The presence of rather high amounts of oxalic acid and nitrates place some limitation on the quantity of leaves that should be consumed daily. The amount of oxalic acid is roughly the same as that found in spinach and chard. Excessive amounts (over 100 G per day?) may result in a level of oxalic acid that begins to reduce the availability of calcium in humans. This is especially a concern if calcium intake levels are low to begin with. Nitrate in vegetable portions of amaranth is a concern because it is hypothesized that nitrates may be chemically changed in our digestive tracts into poisonous nitrosamines. Evidence for this is lacking at the present time. Nevertheless, over 100 g per day may be an unsafe amount to eat according to some scientists. The levels of both oxalic acid and nitrates are reduced by boiling the leaves like a spinach, then discarding the water.

The seed should be as nutritious as cow's milk or soy beans, based only on the quality and amount of protein present. But there are apparently some "anti-nutritional" factors in raw amaranth that lead to quite unexpected results in feeding trials. Performance is improved somewhat by cooking. For example, Dr. Peter Cheeke at the University of Oregon compared the rate of weight gain for rats on diet of corn and ground amaranth seed (Amaranthus hypochondriacus), either raw or

cooked. The average daily gain for rats on the corn-soybean diet during the first 20 days was 3.9 grams. Rats fed the corn-amaranth diet gained on 0.3 grams per day. The average daily gain for rats fed corn and cooked amaranth was 1.6 grams. Raw amaranth seed is extremely unpalatable to rats (i.e. they will not eat it readily). This does not seem to be improved much by cooking. In another study, Dr. Cheeke found that after 11 days on corn-amaranth diet, rats "had an unthrifty, hunched-up appearance, and exhibited symptoms typical of semi-starvation."

I phoned Dr. Cheeke to get his perspective on the seriousness of these negative results. He told me that there are definitely toxins and/or anti-nutritional factors in the raw grain and that it is less of a problem with cooked grain. He said that a scientist in Australia has been feeding raw amaranth seed to poultry as the major component of the diet. He found that chickens went into spasms, convulsions, and finally died. This unidentified factor causes liver damage. Other problems are caused by saponins, including the unpalatability. But to keep this in perspective, Dr. Cheeke pointed out that there are few raw foodstuffs which do not have problems. Raw soybeans contain 10 kinds of toxins. Raw kidney beans will kill rats, but the problem is eliminated by cooking. The key seems to be to use the seed in moderate amounts and to cook it. I asked whether I could say that unless people had little other than amaranth to eat, there should be no problem. He thought that this was probably a fair statement. It is our opinion that more research needs to be done before we can recommend amaranth grain as a major ingredient in animal feed. To our knowledge it has not been shown whether these factors decrease the value of amaranth in human nutrition. It is quite possible that some varieties may lack these anti-nutritional factors. Until more work is done, however, the feeding trial results must moderate our otherwise enthusiastic promotion of amaranth grain. But remember, the Aztecs did quite well on at least selected varieties!

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