



by Jean English
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Synthetic chemical fertilizers won't kill you outright, unless you ingest some quantity directly, I suppose, or unless certain nitrogen fertilizers explode for one reason or another; all such reasons should be avoided. Still, synthetic fertilizers have their environmental, economic and even health-related costs, and those problems have been amplified as conventional farmers have come to rely on these fertilizers.

Environmentally, synthetic fertilizers tend to be more soluble than more complex, organic soil amendments. Because they're more soluble, many can readily leach through soils and into well water, streams and lakes; or they can run off the surface of lawns, farms and gardens and into waterways during rains. Once in the water, they can cause algal blooms, which harm aquatic life; or nitrates from some nitrogen fertilizers may contaminate wells, potentially harming the health of people who drink that well water.

On a large scale, synthetic fertilizers applied to Midwestern farms (mostly grain farms; increasingly grains grown for ethanol production) have polluted the rivers that feed the Gulf of Mexico, killing most of the aquatic life (and the fisheries) in the Gulf. Many people have pointed out that we taxpayers, who subsidize Midwestern grain farmers, are actually paying to pollute the Gulf.

More complex, more slowly-released organic fertilizers are held more tightly in the soil and released more slowly, so they tend to pollute less. It is possible to have some leaching or runoff from manures (especially poultry), for instance, if they're applied excessively or at the wrong time; but organic growers use manures according to organic standards, minimizing or eliminating such problems. (Many conventional farmers also use manures wisely.)

Also, since many organic fertilizers are recycled carbon-containing products that were once plant or animal matter, using organic fertilizers can sequester carbon in the soil, rather than allowing it to enter the atmosphere as carbon dioxide. Organic farming, or any farming that builds the amount of organic matter in the soil, can help alleviate climate change profoundly.

Another environmental problem with synthetic fertilizers is that excess nitrogen in plants (more common with synthetically fertilized plants than with organically grown) can attract pests such as aphids, which often spur growers to use pesticides, and those pesticides can end up in soils and/or in us.

And synthetic fertilizers can harm soil life. Organic growers rely on soil organisms to hold nutrients in their bodies and release them when plants need them.

Economically (in addition to the economic costs of environmental degradation), synthetic fertilizers are increasingly expensive. Natural gas is required to synthesize some nitrogen fertilizers, and fossil fuels are used to mine, process and/or transport other synthetic fertilizers. Prices for these fertilizers have been high for the past few years and have doubled, at least, in the past year. This is one definition of unsustainable farming. Recycling organic materials that are produced close to home is more sustainable.

From a health standpoint, in addition to the potential for nitrate contamination of waters, synthetic fertilizers can push plant growth so much that nutrients in the resulting food are diluted. Buy an organically grown cantaloupe that got an even supply of nutrients over a long period, and you'll get a mouthful of vitamins and minerals (and taste!); buy a conventionally grown, "force-fed" melon, and you're usually buying more water: The plant grew rapidly in response to the rush of nitrogen available, and that growth stimulated more water uptake.

Organic fertilizers usually are more complex and supply more nutrients than synthetic fertilizers, which usually are formulated to provide one, two or three major nutrients only (nitrogen, potassium and phosphorus, the N-P-K listed on bags of fertilizers). Organic fertilizers, by supplying more nutrients to soils and to the organisms that live in soils, cycle these nutrients into crops and into consumers. A number of studies have shown that organically grown foods (fruits, vegetables, grains, meats, dairy products) are more nutritious, in terms of vitamins, minerals and proteins, for instance, than conventionally grown.

The basic philosophy of organic gardening and farming is to feed the soil rather than the plant: A rich soil will take care of the plant, and the plant will take care of you. I'll provide some simple methods for creating an organic garden in my next column. In the meantime, see MOFGA's valuable fact sheets about organic soil amendments, including "An Organic Farmer's Guide to the Interpretation of a Standard Soil Test from the University of Maine," "Providing Nitrogen to Organic Crops," "Natural Sources of Plant Nutrients" and "Using Green Manures."

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