Little changes make big differences in plants

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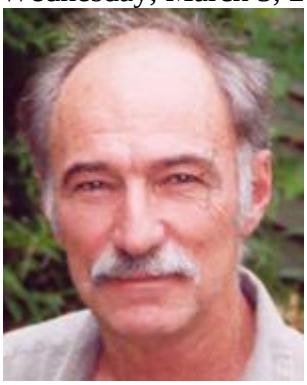

Dennis Sentilles ¦
BY Dennis Sentilles

Very small things in very small quantities can make an overwhelming difference. Rhinoviruses loose in the air from another's sneeze find just the right molecular receptor gap in your nasal passages, and a few hours later you have a miserable cold, your whole body looking, feeling and performing differently than it did just a few hours before. The amount of physical material that triggered this massive reaction can hardly be weighed or seen.

Plants are living beings like ourselves. They are constantly absorbing, using and eliminating a variety of substances, all governed by processes ruled at the molecular level. When just the right ionic states are present in the soil in which they grow, and just the right ionic bonds can be formed at molecules in their tissue, these processes act most efficiently, and if things are too off they may not perform much at all and the plant fails to produce. The problem of soil acidity is familiar to most gardeners: The hydrogen ion concentration in the soil is too great, and the life-building minerals — nitrogen, phosphorous, potash, calcium, sulfur and carbon — are not available to the plant, no matter how much of them is present in the soil.

There is much research to suggest that a minute availability of humic and fulvic acids in the soil can make a notable metabolic difference to the plants of our gardens. Mineral elements bind to humic acid molecules in a form that can be readily used by plants. Fulvic acid molecules are so small that they can readily enter plant tissue carrying molecules of nutrient with them; they are especially favored in quality foliar fertilizers. Humate is a humic substance that offers these two acids and the spectrum of trace minerals to our garden soils in concentrated form.

Adding compost to one's soil is the best first thing one can do to build a good soil, particularly to improve its structure and tilth. When compost decomposes further, to the point where its constituents of leaves and grass and other organics are no longer recognizable, the compost has become humus, no longer a great contributor to soil structure but still a contributor of soil nutrients and some soil acids.

Diamonds are the result of soil weight (pressure) upon long dead vegetative carbon acting over millions of years. Long before these once living plants became diamonds they were first coal, and before that lignite, and before that a highly concentrated humate, specifically pure deposits of highly oxidized carbon known as Leonardite, itself formed from pressure on what was formerly peat remaining from their long-dead vegetation.

Here and there below our earth's surface seams of Leonardite humate can be found on its way to becoming lignite. Ground up after mining, this humate is commercially available as a potent soil additive to be used in small quantities. In another application, the Environmental Protection Agency recommends humate for its efficiency in neutralizing toxins in toxic waste sites.

The general recommendation for humate application is one pound per 100 square feet, at a cost of about 60 cents, and in good soil this is enough for years of gardening. Poor soils can be helped by up to three pounds with successively lesser amounts applied over several years.

Remember though that humate is a substance of nature; its claimed benefits are large over time but slow and molecular in operation, taking some years to fully show. Only humate-based foliar fertilizers are expected to show results quickly.

There is a complexity of soil chemistry, plant biochemistry, electro-chemistry and further science explicating the exact form and multifarious functions of humic substances in the garden, going well beyond the intent of this article.

An Internet search of "humate" will lead you to commercial sources of humate and to some substantive discussions, particularly "Organic matter, Humus, Humate, Humic Acid, Fulvic Acid, and Humin: Their Importance in Soil Fertility and Plant Health" by Robert E. Pettit of Texas A&M.

Many benefits of using humate are claimed, such as:

1. Soil structure: improved aeration and tilth, better temperature modulation and especially water holding capacity and drought tolerance, 2. Soil chemistry: maximized ion exchange capacity and mineral uptake, neutralized acidity and alkalinity, increased fertilizer retention in the root zone, and,

3. Biology: accelerated cell division and increased cell wall thickness with increased vitamin content, along with an increase in desirable soil microorganisms and root length.

A common consumer warning is "when it sounds too good to be true, it probably isn't," but in this case it probably won't hurt, and it certainly seems worth trying in the prescribed small quantities, and, after all, those minute rhinoviruses surely are powerful, albeit they are entirely negative.

Dennis Sentilles, MU professor emeritus of mathematics, is a Missouri Master Gardener and a member of Katy Trail Slow Food International with a love for working outdoors and eating simply and well every day. He can be reached at sentillesd@missouri.edu.