Healthy Soil Grows Healthy Food

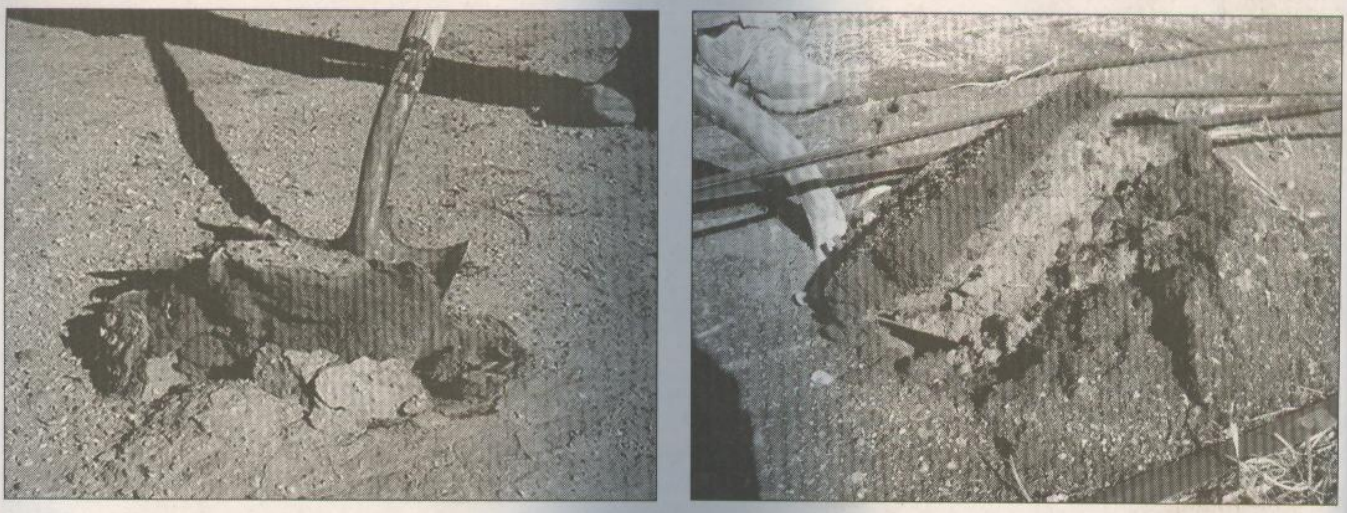
by Michael Martin Meléndrez

It's interesting to note that if you look back in history at any photo with a large number of people, almost everyone is slim and trim. I was recently reading a pictorial essay of Albuquerque, New Mexico, images from the early to mid-1900s, and found this to be true. Today, however, if you look at any typical crowd, obesity is everywhere.

There are many reasons for this situation, but I feel certain that the eating of empty calories, food produced on poor soils, and the long-distance transport of these compromised groceries are a major culprit. The diet of those earlier years was more likely composed of foods loaded with vitamins, enzymes, minerals and low in corn syrup based ingredients. Therefore people did not eat empty or "hollow calories" (the FDA's term, not mine) and their foods had a high Satiety Index (a system to measure different foods' ability to satisfy hunger), so they did not overeat in order to feel satisfied. Today our diet is dominated by empty (hollow) calories low in minerals, vitamins and enzymes and which have a low Satiety Index, so we overeat and get fat.

Even before the processing of our food strips its nutritional value, there's a bigger problem: the world has been losing its precious topsoil, the humus fraction that defines a healthy soil, for the past 7,000 years. The Fertile Crescent of the Middle East, which today is a desert, was at one time rich in topsoil and had forests of oaks protecting the watersheds from erosion. But farming ruined the soil, as it continues to do today, regardless of where the farm is found. The problem has accelerated in the past 60 to 80 years, as agriculture became distracted from the importance of humus, the generic term for a product of soil chemistry that is more correctly referred to as *humic substances.*

Collecting microbes from the wild.



Improving soil through biological "priming" — before and after.

The distraction was the invention of manufactured fertilizer when it was discovered that soluble acidic based N, P and K (nitrogen, phosphorus and potassium) could stimulate plant growth and increase yield. But no longer was there a pipeline of humic formation taking place in soils thus treated, nor were the 19 essential plant nutrients being replaced, as they were being mined from the land each time a crop was harvested. The result: empty calories, poor nutrition, hunger and overeating to compensate for our poor diets.

It's important to understand that the presence of these "humic substances" constitutes the *definition* of a topsoil, and that they are not organic matter in the true sense, rather they are more correctly called *bioorganic molecules*. In the *Journal of Chemical Education* (vol. 78, December 2001), it is said that these humic substances, composed of chemical fractions such as humic acid and fulvic acid, are highly functionalized molecules that can act as photosensitizers, retain water, bind to clays (which

Questions for Kinsey

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Q When is the best time to take soil samples?

A This question is probably asked more often than any other. The answer depends on the specific management goals set by a grower and depends on a variety of factors. How long has it been since the soil was sampled? Has nitrogen or sulfur been applied, and if so, how recently? How dry is the soil that is to be sampled? What type of crop will be planted? Will lime or certain micronutrients like copper, manganese or iron likely be needed for the next crop? When will the crop be planted? Will it be convenient to re-sample at the same time of year in the future? All of these questions have to be considered before we can properly determine the best time to take soil samples.

First, all growers should consider this: if it has been over two years since you last sampled, the best time to take new soil samples is as soon as it can correctly be accomplished. But consider the answers to the following questions before you make that decision.

We have clients who prefer to see the nutrient levels of their soils when they are at their very worst. This is generally just after a crop is harvested, or when the greatest amount of undecomposed residues are still present. Others want to see their soil at its best, when optimum temperature and moisture are present, the maximum amount of residue decomposition has occurred, and any plants growing there have not matured to the point where they are removing large amounts of nutrients. Ultimately, each grower should plan to take samples at the same time of year each time for comparison purposes on each field. So, once you are past any initial needs arising from a previous lack of sampling, choose a time that is convenient.

Planning ahead to be sure the samples are taken in a timely manner for the crop, sometimes even before the present one has been harvested, can make a big difference. This is especially true when lime or fertilizer might be needed for the next crop to be grown, and there may not be sufficient time to get everything done after harvest.

Before deciding on the best course, however, consider a few other requirements. When drought conditions persist to the point that grass will no longer grow, the soil is too dry to sample. This dry condition will cause the pH to drop, and calcium and magnesium levels will appear lower than is actually the case. The same holds true if significant amounts of nitrogen have been spread in the previous 30 days, or sulfur in the previous 60 to 180 days. Sampling should also be postponed where fertilizer is being added to small areas, such as with drip systems or hand applications around plants. Anything that tends to make the soil more acidic (drops the pH) should be considered, as well.

If you are taking samples on your land only occasionally, it is advisable to review the sampling instructions each time. Remember, the recommendation derived from the analysis is only as good as the sample taken. When samples are properly taken, the Albrecht Model of soil analysis will show which materials work best.

For those who agree that the points made above are of utmost importance, we hope you will consider working with us to provide the needs of your soil and the crops to be grown there.

will improve the tilth and porosity of soil), act as plant-growth stimulants, and scavenge toxic pollutants. It also claims that these substances are remarkable products of soil chemistry that are essential for a healthy and productive soil. I don't know about you, but I find this information about the humic substances remarkable, refreshing and exciting!

An even more critical issue I've been concerned about for the past few years is that of population growth and our ongoing loss of farmland across the globe. Every reference I can find, from the USDA to the coffee-table periodicals (such as *National Geographic*, "Where Food Begins," September 2008) all say the same thing — we are not gaining farm land, we are *losing* farm land at an alarming rate. The population of the world will grow by at least 6 million people in the next 12 months, and according to the USDA it takes six acres to provide enough food/calories to feed each person. This figure is confirmed by work done at Sandia National Labs of the Department of Energy, where a project I've had connections to has created an "Ecological Footprint Assessment" model that shows the same problem. If true, we will need an additional 36 million acres of new farmland to accommodate this population increase. That's *56,000 square miles of land*, almost half of the State of New Mexico, needed to feed the population growth for this year!

It is my opinion that time is of the essence in the effort to change how we farm. We must begin priming and supporting the soil development process so that humus can once again be a product of soil chemistry on our farms, and we must remineralize our soils so that our food is not just empty calories. Furthermore, if you are not *making* humus in your soil, you need to be *adding* it, as the research is clear that the benefits are extraordinary and will move us in the right direction.

On a final note, with all the talk about global warming and excessive dumping of carbon into our atmosphere as we consume fossil fuels, it is the process of humic substance formation in our soils that can sequester more carbon than all the trees and oceans of the world combined. The benefits will be long-lasting, as components of humus are molecules of aromatic carbon rings and aliphatic carbon chains. The mean residence times (how long they last in soil) of these organo-mineral complex aggregates based on radiocarbon dating, using extracts from non-disturbed soils, is from 1,140 years to 1,235 years, depending on which humic acid fraction is being tested. In other words, unlike compost and decomposing soil organic matter, which are "rapid cycling carbons," the humic substances will last a long time, and therefore tie up carbon for that same period of time. The end result will be healthy soils growing healthy food.

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