The Influence of Cooking, GMOs and Modern Agriculture on Nutrition

What Is Soil?

Soil is alive. Much more than a prop to hold up your plants, healthy soil is a jungle of voracious creatures eating and pooping and reproducing their way toward glorious soil fertility.

A single teaspoon (1 gram) of rich garden soil can hold up to one billion bacteria, several yards of fungal filaments, several thousand protozoa, and scores of nematodes, according to Kathy Merrifield, a retired nematologist at Oregon State University. Most of these creatures are exceedingly small; earthworms and millipedes are giants, in comparison. Each has a role in the secret life of soil.

Bacteria make up the largest group in the soil jungle, and they are as diverse as they are numerous. Some kinds of bacteria are responsible for converting atmospheric nitrogen to plant-available forms, a process known as nitrogen fixation. Actinomycetes, with cells like bacteria and filaments like fungi, are thought to contribute chemicals that give newly tilled soil its earthy aroma.

Mycorrhizae are fungi that form a relationship with plant roots and increase their ability to take up nutrients from the soil. These filaments, along with root hairs and other binding substances produced by bacteria and fungi, help hold soil particles together and keep soil from eroding.

Protozoa are single-celled, mostly motile organisms that feed on bacteria and other tiny organisms as well as each other. There may be thousands of them living in that teaspoon of soil. Protozoa release nitrogen, making it available to plants. As much as 80 percent of the nitrogen in plants can come from bacteria-eating protozoa.

Nematodes, simple roundworms, have evolved several feeding strategies. In temperate soils, some eat bacteria while others eat fungi or soil algae. Some

nematodes attack plants, piercing plant cells and sucking out the contents. Some nematodes eat other nematodes or other small invertebrates.

Earthworms, giants of the soil jungle, mix and aggregate soil particles, creating deep channels that help aerate the soil and provide channels for growing roots. They shred and bury plant residue that stimulates microbial activity and increases the soil's capacity to retain moisture. Earthworms consume tiny soil organisms and excrete even more microorganisms in their castings.

The base of the soil food web is organic matter, material derived from living stuff that provides a source of energy stored as fixed carbon. Nutrients are "served" along with fixed carbon as carbon is converted to energy. Chemical fertilizers supply specific nutrients directly to plants, but they do not replace the other kinds of food that bacteria and fungi need. Soils with more organic matter tend to have more life. Mulching with compost, cover cropping and no-till farming practices tend to increase organic matter and thus increase the number and diversity of microorganisms in soil.

"All these things that live in the soil may seem unimportant," says Merrifield, "but they work together in a system that is truly the foundation of life."

Story Source: Kathy Merrifield

Aliphatic, Cyclic, and Aromatic Organic Acids, Vitamins, and Carbohydrates in Soil: A Review

Valerie Vranova, Klement Rejsek, and Pavel Formanek

Department of Geology and Soil Science, Mendel University in Brno, Zemedelska 3, 613 00 Brno, Czech Republic

Received 1 August 2013; Accepted 15 September 2013

Academic Editors: M. Dunn and G. Liu

Abstract

Organic acids, vitamins, and carbohydrates represent important organic compounds in soil. Aliphatic, cyclic, and aromatic organic acids play important roles in rhizosphere ecology, pedogenesis, food-web interactions, and decontamination of sites polluted by heavy metals

and organic pollutants. Carbohydrates in soils can be used to estimate changes of soil organic matter due to management practices, whereas vitamins may play an important role in soil biological and biochemical processes. The aim of this work is to review current knowledge on aliphatic, cyclic, and aromatic organic acids, vitamins, and carbohydrates in soil and to identify directions for future research. Assessments of organic acids (aliphatic, cyclic, and aromatic) and carbohydrates, including their behaviour, have been reported in many works. However, knowledge on the occurrence and behaviour of D-enantiomers of organic acids, which may be abundant in soil, is currently lacking. Also, identification of the impact and mechanisms of environmental factors, such as soil water content, on carbohydrate status within soil organic matter remains to be determined. Finally, the occurrence of vitamins in soil and their role in biological and biochemical soil processes represent an important direction for future research.

https://www.hindawi.com/journals/tswj/2013/524239/

Eat Dirt? Soil Is Good for You!

https://abcnews.go.com/Health/Diet/story?id=1167623&page=1

How Is Soil Quality Being Destroyed and What Are the Consequences for Nutrition and Health

The plants we eat support human health in many ways. They provide us with carbohydrates, proteins and fats for energy, and with vitamins and minerals to support the body's essential processes. These vitamins and minerals are both synthesised in the plant and drawn from the surrounding soil.

Unfortunately, the nature of modern farming practice is that the quality of vitamins and minerals in the soil have been gradually degraded over hundreds of years, meaning that less and less of these vital micro-nutrients are making their way into the food we eat. In fact, to get the same amount of vitamin A from an orange as our grandparents would have done, we would need to eat eight oranges today.

Prior to the advent of farming plants grew wild and the edible parts or the whole plant were harvested as needed. Any nutrients drawn from the soil as the plant grew were gradually replaced through excrement or when organisms died, maintaining the quality of the soil. Modern intensive farming is different. Soil is used continuously to grow crops, to meet society’s ever-increasing food requirements. Produce is shipped

thousands of kilometres around the world, with no way of the minerals contained making their way back.

Unfortunately, this leads to the soil becoming stripped of valuable nutrients, with each crop containing less of them than the one before. Modern agriculture is focused on producing crops maximised not for nutrition, but for size, fast growth rate and resistance to pests. These faster growing crops allow farmers to produce more output in a year, but do not enable plants to manufacture or uptake nutrients at a similarly faster rate.

A large-scale study on the nutrient value of foods conducted between 1930 and 1980 and published in the British Food Journal found that in 20 vegetables the average calcium content in this time had declined 19%, Iron 22%, and potassium 14%. Vitamins A and C, niacin, riboflavin, thiamine, magnesium, zinc and copper also showed a reduction in this time. On top of this, produce is increasingly being shipped thousands of miles and sitting in storage or on shelves for weeks, meaning evening greater degradation of the nutrient profile.

How Is Soil Depletion Affecting Your Food?
https://www.vitacost.com/blog/food-nutrition/nutrition/how-is-soil-depletion-affecting-your-food.html

The Organic Consumers Association cites several other studies with similar findings: A Kushi Institute analysis of nutrient data from 1975 to 1997 found that average **calcium** levels in 12 fresh vegetables dropped 27 percent; **iron** levels 37 percent; **vitamin A** levels 21 percent, and **vitamin C** levels 30 percent. A similar study of British nutrient data from 1930 to 1980, published in the *British Food Journal*, found that in 20 vegetables the average **calcium** content had declined 19 percent; iron 22 percent; and **potassium** 14 percent. **Yet another study concluded that one would have to eat eight oranges today to derive the same amount of Vitamin A as our grandparents would have gotten from one.**

Soil depletion and the decline in nutritional content of fruits and vegetables
https://www.sott.net/article/338538-Soil-depletion-and-the-decline-in-nutritional-content-of-fruits-and-vegetables

How Does Cooking Influence Nutrition?

Cooking can alter a food's vitamin C content

Amber's pepper results are similar to other scientific findings, Carr says. *"The amount of vitamin C in foods generally decreases with cooking," she notes. The vitamin can leach*

out into the water in which peppers are cooked. Heat and other chemical processes also can break it down.

But we ***might*** still get more vitamin C from some cooked vegetables than raw, Carr says. How? Cooking or blending can soften and break up plant cell walls, she explains. This can make it easier for the body to use the vitamins inside. Some of those vitamins can stay locked within raw vegetables if chewing and digesting doesn't break up enough cell walls. But it depends on what the vegetable is, how it's cooked and how much is eaten. "In other words, it is difficult to know exactly how much will be taken up from different foods unless blood vitamin-C levels are tested," Carr says.

https://www.sciencenewsforstudents.org/blog/eureka-lab/cooking-can-alter-foods-vitamin-c-content

The GMO Factor

GMO Foods Are A Source of The Problem

Most nations in the world have no GMO-Free platform to protect their citizens and although this is slowly changing, most nations are far behind places like Ecuador, Peru, Venezuela, Egypt, Russia and others who have GMO-Free or national bans on GMOs. Nations such as The United States, Canada, China, UK, Australia, Mexico, and most of South America, Asia and Africa who have no formal GMO-free platforms so that they continue their unrestricted and widespread use in all foods.

The important thing to note in these deficiencies is that these are exactly the deficiencies in a human being that lead to susceptibility to sickness, disorders and cancer. People who have osteoporosis are low in calcium and magnesium, people who have cancer are low in maganese. The list goes on and on. A stunning report on GMO vs. organic corn posted on Moms Across America clearly shows the nutritional value difference between GMO corn and NON GMO corn.

- Non-GMO corn has 6130 ppm of calcium while GMO corn has 14 -- non-GMO corn has 437 times more calcium.
- Non-GMO corn has 113 ppm of magnesium while GMO corn has 2 -- non-GMO corn has about 56 times more magnesium.
- Non-GMO corn has 113 ppm of potassium while GMO corn has 7 -- non-GMO corn has 16 times more potassium.
- Non-GMO corn has 14 ppm of manganese while GMO corn has 2 -- non-GMO corn has 7 times more manganese.

Overall, non-GMO corn is **20 times richer in nutrition, energy and protein** compared to GMO corn.

Sources:
ncbi.nlm.nih.gov
scientificamerican.com
momsacrossamerica.com
kushiinstitute.org
organicconsumers.org

Vitamin Megadosing

Vitamin C Megadosing
https://thatvitaminmovie.com/
http://drsuzanne.net/dr-suzanne-humphries-oral-intravenous-vitamin-c/
https://www.youtube.com/watch?v=W5Bgdqsorg0 (Dr Andrew Saul)
http://www.naturalnews.com/043972_vitamin_C_cancer_treatment_intravenous_injections.html
https://www.naturalnews.com/2017-02-01-fda-quietly-bans-powerful-life-saving-iv-bags-with-vitamin-c.html

Plant-Based Diets Can Improve Your Health and Mood!

I've done much reading about human health and happiness, and I've never found an article arguing that meat is good for our health and mood. Cheese might be an exception, since all dairy products contain an opioid that is meant to make calves want to drink as much as possible, so that they can grow as much as possible. This might explain why people seem addicted to cheese, the most concentrated dairy product. Four chemicals are primarily responsible for our happiness: serotonin, endorphins dopamine, and oxytocin, Here are some of the benefits provided by a plant-based diet:

1. https://www.theplantway.com/tryptophan-foods-boost-serotonin/
2. https://www.fitday.com/fitness-articles/fitness/exercises/endorphins-101-a-guide-to-natural-euphoria.html
3. https://www.naturalnews.com/2019-12-01-dopamine-fix-heres-how-to-naturally-boost-it.html
4.

And if you're worried about marijuana, I'm very sorry to report that its ingredients also exist in normal plants:
https://herb.co/learn/plants-contain-healing-cannabinoids/
https://www.royalqueenseeds.com/blog-plants-other-than-cannabis-that-produce-cannabinoids-n714

Rebuilding Soil Fertility

Industrial farming involves returning only 3 main minerals to soils that are losing many dozens of minerals with every harvest. Now the animal and sewage industries want to turn their antibiotic, hormone and drug-filled crap into fertilizer for farms.

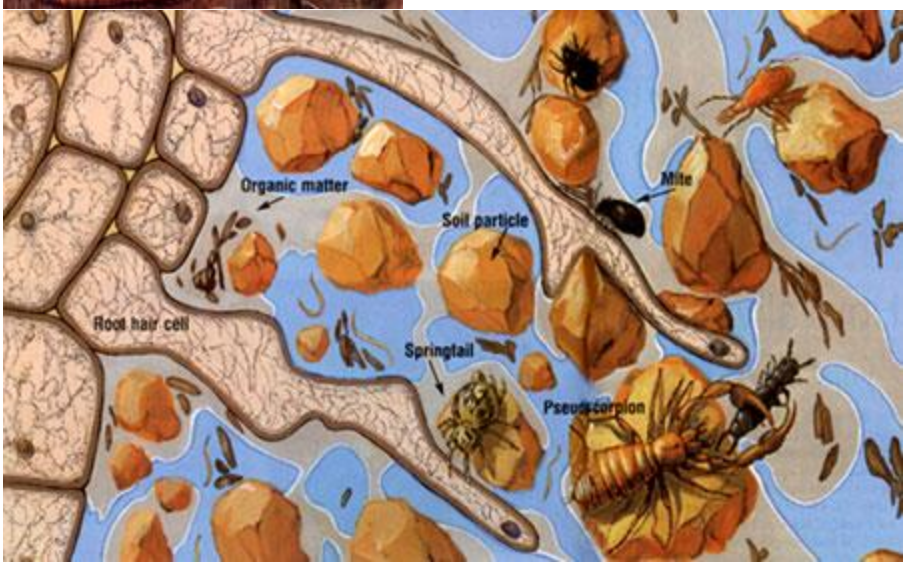
Biosludged – the movie
http://www.brighteonfilms.com/Biosludged/

Learn the basics for building fertile soil in your garden by joining Doreen G. Howard as she discusses no-till soil and permanent beds.

By Doreen G. Howard

- 

  Building fertile soil begins with an understanding of what elements makes for good soil for the garden.
  ILLUSTRATION: MICHAEL ROTHMAN

- 
- 

Building fertile soil means learning how to feed the soil to feed the plants.

It's a fundamental axiom of organic gardening and farming, and once you understand what "feeding the soil" means to building fertile soil, you'll also understand why organic methods, and no-till techniques in particular, work so well.

Even though you can't see most of it, a complex soil food web lives in your garden; it's teeming with earthworms, mites, bacteria, fungi — all kinds of mostly microscopic, interdependent organisms that release mineral nutrients and create the loose soil structure crops need to thrive. Beneficial mycorrhizal fungi (see "The Magic of Mycorrhizal Fungi," page 24 in this issue) grow in and around plant roots, mining subsoil for nutrients and water to share with your crops. Other microorganisms prevent diseases and help plants withstand insect attacks.

Your crops actually help feed all this underground life. Ray Weil, a renowned soil scientist at the University of Maryland, College Park, says that while plants invest a "substantial amount of their photosynthesis in feeding soil microbes, the plants are obviously getting benefits back."

Think of plants, with their green chlorophyll, as little solar-powered engines that pipe a steady flow of carbohydrates out through their root hairs. **Between 20 percent and 40 percent of a plant's total carbohydrate production is released into the soil through its roots.** In the nutrient-rich area around the root hairs, microscopic bacteria and fungi feed and multiply. Nematodes (tiny worms) and other critters move in to feed on the bacteria; in turn, the root hairs absorb nutrients released by the concentration of microbes.

But this complex, mostly invisible soil ecosystem can be damaged easily. Chemical fertilizers, dehydrated chicken manure or high-nitrogen blood meal can burn tender root hairs, and tilling or plowing destroys soil texture, disturbing the layered web. Leaving the soil bare shuts off the carbohydrate food supply; lack of moisture and ultraviolet rays kill some of the organisms that dwell in the surface layer. (Mother Nature almost never leaves the soil uncovered; only on farms and in gardens do we see naked soil.)

More and more farmers and gardeners are learning new ways to protect and promote the development of this amazing soil food web. They foster the natural fertility that comes from a healthy food web, and you can do the same.

First, minimize plowing, tilling and digging. Second, use compost, grass clippings, leaves and other organic mulches on a regular basis to promote and sustain the soil food web. Third, always keep the soil covered with live crops or, at minimum, an organic mulch. Whenever you are not growing a food crop, sow a cover crop so the carbohydrate pipeline isn't shut off.

Permanent Garden Beds and No-Till Soil

Every time the soil is tilled, surface-layer organisms are buried, threads of beneficial fungi are broken and earthworm tunnels are destroyed. Steve Diver, an agriculture specialist with National Sustainable Agriculture Information Service (ATTRA), says plowing can bury plant debris and topsoil up to 14 inches deep — where oxygen levels are too low for decomposition.

The buried debris then acts as a physical barrier to the movement of water upward and downward. **Tilling or plowing also introduces excess oxygen that causes organic matter to decay too fast**, and tilling causes plants to give off more carbon dioxide, contributing to global climate change.

"Even if you cultivate only 2 to 3 inches deep," says Weil, "more damage is done than good." Worm channels and root paths that facilitate water absorption are destroyed, and soil clumps or aggregates are broken up, leaving little air space in the top layer. Then, raindrops pound on the soil particles, pushing them even closer together, creating an impenetrable, crusty surface.

Weil says good garden soil should be about half porous space occupied by air and water. Compacted soil, created by rainfall on bare ground and the use of heavy equipment or repeated walking upon the ground, has much less space for air and water. That's a recipe for crop failure.

Weil's specialty is managing microbes on farmland, but he handles the soil food web in his home garden the same way. He makes permanent beds that are 4 feet across, so all work can be done from the sides without having to ever step on the soil.

The object is to avoid walking on the soil in the beds, or disturbing it or any plant roots in other ways. Diver says, "The roots left in the ground are food and shelter for microbes and earthworms." To incorporate compost into the soil, he suggests spreading it across the surface with a rake and covering it immediately with mulch. "The worms will move the compost into the soil."

Weil advocates a no-till/cover-crop approach to microbe management. "Start by applying a layer of compost and mulch if the soil is decent," he says. "The soil is not compacted if you can push a wire flag 12 inches into wet ground."

If the soil is severely compacted or poorly drained, build raised beds (see directions for building your own in Solving Compacted Soil Problems). Weil likes to begin in late summer or early fall by staking out the beds and planting a cover crop of a mixture of rye and hairy vetch.

The following spring, he uses a scythe to cut the cover crop (electric or gas-powered weed trimmers work well, too), cutting as close to the surface as he can and spreading the debris to an even thickness over the bed with a rake. [You also could let Mother Nature handle this job by using a less winter-hardy crop such as oats, which will grow strongly in the fall and die in the winter in U.S. Department of Agriculture Hardiness Zone 6 and north, and in much of Zone 7.]

"The best mulch will be had," Weil says, "if the cover crop is allowed to grow until it 'heads out' or flowers, and if high-residue cover-crop species (such as rye) are included in the mix." However, if the cover crop residue is too thin to completely cover the soil, Weil recommends spreading a couple of inches of mulch to cover the soil well. To set out transplants, he simply makes a hole in the mulch and digs out enough soil to accommodate the root ball. The soil is replaced, and mulch is pushed around the transplant. Seeds can be planted by making a narrow part in the mulch with a rake, then drawing a small furrow with a pointed stick in which to sow the seeds. If the soil is too firm, Weil pulls an old meat hook or curved crowbar through it like a single tine on a harrow; the zone of disturbed soil need be only a couple of inches wide.

Once a permanent bed is established, feed the soil food web regularly. Elaine Ingham, president of Soil Foodweb Inc., a firm that specializes in growing plants without pesticides and inorganic fertilizer, says the best way to manage a healthy microbial ecosystem in a home garden is to routinely apply organic material such as compost.

Ingham suggests gauging the amount needed by what has disappeared from the soil during the previous season. Generally, adding one-half inch to 1 inch of compost every spring will be plenty. In hot climates, where decomposition is rapid, or in regions with heavy rainfall or sandy soil, make at least two 1-inch applications, one in early spring and the second in late summer or early fall.

Mulching the Garden is a Must

Beyond the obvious benefits of suppressing weeds and preventing soil crusting, mulch helps maintain the soil food web. Mulch dramatically increases the amount of rainwater that enters the soil and decreases the amount of water that runs off the surface. Runoff takes soil with it, damaging the food web. Even modest mulch or cover crop coverage (10 percent to 30 percent), Weil says, substantially improves rainfall saturation and erosion control. (In some areas, mulch may keep the soil too wet or cool, in which case you can rake some of it back to allow the soil to warm up and dry out.)

Organic mulch also feeds soil microbes. Earthworms move organic matter from the surface down to root zones where it can be used by bacteria. Many diseases are prevented or slowed by beneficial fungi living in mulch. A North Carolina State University study showed that only 3 percent of tomatoes mulched with composted cotton gin trash became infected with Southern blight, a fungal disease, compared to 66 percent of unmulched control plants. The composted mulch was an ideal breeding ground for beneficial fungi (Trichoderma), which killed or prevented the blight. Numerous disease-causing bacteria and fungi are found in the soil, but a healthy,

diverse soil food web, nourished by mulch, allows beneficial microbes to naturally control or eliminate those that cause problems.

Start with a 3-inch to 6-inch layer of organic matter (tell your neighbors you want their bags of clean grass clippings and leaves). As the material rots and compacts, add more to maintain the depth.

If you don't grow cover crops, mulch thickly so microbes and earthworms have cover and a food supply during the winter. Instead of discarding autumn leaves, shred them with a lawn mower and use them to mulch beds. Other easy-to-find mulch materials include hay, grass clippings and wheat straw.

Cover Crops for the Garden

Cover crops are the web's best friend. They protect bare soil, add nutrients and offer a stable environment for microbes and earthworms when ground is fallow. Cover crops help reduce the harmful effects of erosion from rain and wind, and, by moderating soil temperature, prevent heaving caused by alternate freezing and thawing. As cover-crop roots decay, they leave channels for new plant roots to find.

While Weil favors a legume-grass mixture (a hairy vetch-and-rye combination) for cover crops, Diver favors clovers. "I love crimson clover because it has such a pretty flower," Diver says, "and subterranean clover because its plant residue is very effective at suppressing weeds." He says the effectiveness of oilseed radishes as a cover crop also has been studied in cold climates. The radishes endure frigid winters, send taproots deep into the soil and manufacture glucosinolates that repel parasitic nematodes. Glucosinolates are sulfur compounds found in the brassica family, including radishes, that act as biofumigants for the soil. Consider using a brassica cover crop if pest nematodes are a big problem in your garden. (Some nematodes attack plants while others help control soil-dwelling insect pests such as lawn grubs. This second type can be purchased and introduced to the garden.)

It's important to match cover crops to your region's seasonal growing cycles. Some covers, such as buckwheat or sorghum, thrive during hot summer months, while others, such as oats or winter rye, will grow only when temperatures are barely above freezing. And if you are going to rake, dig or till in a cover crop, Weil cautions, do it at least 10 days before planting. "Some plant residues have short-lived alleopathic or ammonium-release effects, which could interfere with crop seed germination, as well as weed seed germination," he says.

To learn which cover crops will work best in your region's seasons, MOTHER highly recommends the online e-book, Cover Crops for all Seasons.

Another resource is your local farm/seed store.

Doreen Howard has been building her own soil food web for more than 20 years. When not in the garden, she lectures and writes about sustainable gardening.