

a voice
for the natural
landscaping
movement



Reprinted from the
Wild Ones Journal,
July/August 2008
issue.

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FURTHER MYSTERIES EXPLORED

By Maryann Whitman

It's All One Piece

Landscaping practices as promoted by Wild Ones have far-reaching implications, with beneficial effects on biodiversity and atmospheric carbon dioxide. ¶ This series of articles explores the ways we are part of this delicate system of connections.

In the May/June issue of the *Journal*, we discussed what it is about native plants that makes them unique. We concluded that their long lives, with the resultant massive root structures, and millennia of adapting to their life space, while also co-evolving with other living organisms in their life space, were all relevant factors.

Quoting Dr. Elaine Ingham, a soil biologist at Oregon State University, we listed the numbers of soil organisms that come in contact with the roots of native plants. She said, "If you grow the proper number and types of bacteria, fungi, protozoa, nematodes, microarthropods, and mycorrhizal fungi in the root systems of the plants...if the soil is healthy for the types of vegetation desired...there should be no reason to use pesticides and fertilizers."

One square millimeter of healthy soil, laid out under a microscope would give us a rough idea of what goes on among the roots of our native plants. Remember that a millimeter is one thousandth of a meter – less than the length of this hyphen (-).

Every bit of soil among our native plants' roots is potentially teeming with activity, as microorganisms go about their business, eating, excreting, and reproducing, and in the process, helping our plants grow. As the plants grow, they slough off root cells, excrete gases, amino acids, and sugar solutions, and finally about a third of the root structure of a plant dies each season, to be replaced and added to the following season. Every niche and crevice may contain a microhabitat that may be wet or dry, acidic or basic, oxygen-rich or oxygen-poor, nutrient-rich to nutrient-poor. The chemistry of life is happening everywhere; with chemical bonds being made and broken, energy is exchanged and harvested. All of this comprises soil organic matter, which is 58 percent carbon.

The final remains, the residue of these life processes, is humus – a relatively stable form of carbon sequestered in soils for decades and centuries. It is made up of all the remnant bits and pieces of plant, animal, microbial, organic material that is termed recalcitrant organic matter – it doesn't break down easily.

This is natural carbon sequestration in healthy, undisturbed soil.

Though some of the concepts have been relabeled, few are new. In 1961, J. E. Weaver, whose career as a plant and soil biologist was launched with his first publication in 1914, wrote:

Root channels furnish entry for a vast number of organisms that live in the soil.

Many are animals that subsist mostly on living plant materials; others are largely predatory, or are parasitic, or subsist on plant residues. Algae, fungi, actinomycetes, and bacteria are representative plants. Each absorbing root is encased in an extremely well-populated but thin layer of soil – the rhizosphere – in which microorganisms are especially abundant and active. Many or most of the various soil organisms probably also occur in the parent materials and add to

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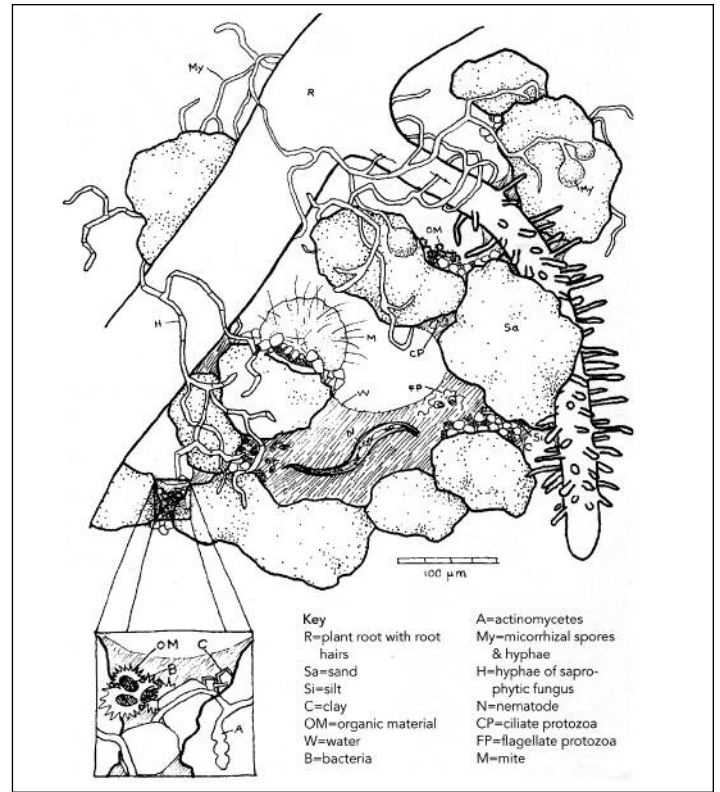
the amount of organic matter, which is chiefly furnished by roots, and thus play a role in the preparation of soil from parent materials.

From: JE Weaver 1961. The living network in prairie soils.
Botanical Gazette, 123:16-28.

Footnote: The "parent material" is the ancient primary material from which the surface, fertile soil is formed. Its depth varies, from inches to hundreds of feet.

Within the past decade enough research has been done with the microorganisms in the soil for biologists to have come the conclusion that specific plants grow better in the company of specific soil organisms – and vice versa. Not only do soil organisms mediate the production of different nutrients, not all plants are able to deal with the same nutrients. The "Soil Web of Life" is a complex one that changes over time as plants mature and alter their life spaces. In his book, *Bringing Nature Home*, Dr. Douglas Tallamy tells us that specific insects prefer to live with, and in fact rely on for livelihood, specific native plants. It does not require much of a stretch of the imagination to suspect that the "Soil Web of Life" has similar essential, unconditional relationships – that specific native plants prosper in the company of particular native species of soil organisms.

We will continue to explore the mysteries of the "Soil Web of Life" in the next issue of the *Wild Ones Journal*. ▲



This drawing illustrates a soil habitat containing mineral soil particles: sand (Sa), silt (Si), clay (C); organic matter (OM), water (W), a plant root with root hairs (R) and, soil organisms: bacteria (B), actinomycetes (A), mycorrhizal spores and hyphae (My), hyphae of a saprophytic fungus (H), a nematode (N), ciliate protozoa (CP), flagellate protozoa (FP), and a mite (M).