Most crops are active for only about six months or less, but the biology beneath the soil surface is working year around. Here are a few ways a healthy soil supports your crops and how practices such as cover crops and residue management improve soil health.

In-season soil microbes associate with the crop plant roots, many forming symbiotic relationships, such as providing nutrients in available forms to the crops. Other microbes mineralize nutrients from organic compounds in plant residues, releasing them in forms that the crop plants can use. The microbes get food from the plant roots.

While most chemical fertilizers are readily taken up by plants, organic fertilizers must first be mineralized by soil microbes or other organisms before they can be used by plants. Some mineral fertilizer forms also require microorganisms to convert them to plant-available forms.

Between crop seasons, surface residues and cover crop foliage and roots help control runoff and soil erosion.

Some soil microbes feed on the dead plant roots and the crop residue that has been tilled into the soil, producing various important soil organic matter compounds that help with carbon balance. They also help redistribute nutrients from the surface to deeper in the soil profile.

Cover crop root systems help to loosen the soil, improving water relations, root growth, and aeration. They also can help redistribute nutrients from the surface to deeper in the soil profile.

Cover crops during the off-season provide a source of carbohydrates that helps maintain microbial populations. They also tie up plant nutrients, helping avoid losses to the environment between seasons. Many common cover crops have very extensive root systems, growing to depths of several feet into the soil.

A good silty clay loam soil is about 50% solid materials (sand, silt, clay) and 50% pore space. The pore space at field capacity moisture content is filled approximately half with air and half with water. The various organisms also fit into the pore spaces.

Bacteria, fungi, and other microorganisms play critical roles in making nutrients available to plants through various biological, chemical, and physical actions. Mineral nutrients, soil organic matter, and gaseous releases, such as CO2 and nitrous oxide, are regulated by these organisms.

Earthworms, mites, insects, and other animal life also inhabit the root zone and aid in the decomposition of organic materials and release of minerals into the soil solution.

Mycorrhiza is a symbiotic association of fungi (myco) with plant roots (rhiza), which benefit both. Fungi obtain carbohydrates from roots and help supply water and nutrients (especially P) to the plant. The mycorrhiza association effectively extends the length and efficiency of the plant root system, forming conduits to help carry water and nutrients to the plants.

A whole world of biological activity exists under our feet in a living soil. Successful Farming | Special Summer 2013