

USGS. Biological Soil Crusts: Web of Life in the Desert

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Biological Soil Crusts
Web of Life in the Desert

Stop! Don't step on that soil. It's full of life.

What and Where Are Biological Soil Crusts?

Although the soil surface may look like dirt to you, it is full of living organisms that are a vital part of desert ecosystems. This web of life is called a biological soil crust. These crusts are found throughout the world, from hot deserts to polar regions. Crusts generally cover all soil spaces not occupied by green plants. In many areas, they comprise over 75% of the living ground cover and are key in reducing erosion, increasing water retention, and increasing soil fertility. In most dry regions, these crusts are dominated by cyanobacteria (previously called blue-green algae), which are one of the oldest known life forms. Communities of soil crusts also include lichens, mosses, microfungi, bacteria, and green algae. These living organisms and their by-products create a continuous crust on the soil surface. The general color, surface appearance, and amount of coverage of these crusts vary depending on climate and disturbance patterns.

Erosion Control

The organisms in crusts protect soil from erosion in a variety of ways. Some organisms, such as cyanobacteria and microfungi, protect themselves from sharp sand grains by secreting sticky mucuslike around their cells. These microbes move through the soil when wetted, leaving the mucuslike behind as a trail. These mucuslike trails glue soil particles in place. Mosses and lichens function a bit differently. They cover and protect the soil surface in dry spots as plants, but they also have small rootlike anchoring structures that penetrate into the soil surface. The soil-binding action of crusts is not completely dependent on the presence of living organisms. Layers of abandoned material, built up over long periods of time, can still be found clinging tenaciously to soil particles at depths greater than 4 inches (10 cm) in some soil.

Water Retention

Soil crusts are important in the absorption of rainfall. This function is especially important in arid areas that experience sporadic, heavy rainfall. When it rains, the organisms and their mucuslike absorb up to ten times their volume in water and then release the water slowly into the soil once the rain ends. In cold areas, biologically created soils freeze in winter and create a roughland surface. The roughness slows rainwater runoff, which increases water infiltration into the soil.

Quantitative observations to soil grains & life

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