

FACT SHEET – BIOCRUSTS IN ARIZONA

What Are Biocrusts?

Crouch down and look closely at the dirt in Arizona and you're likely to see a vital part of the ecosystem – biocrusts. Biocrusts (also known as biological soil crusts) are communities of cyanobacteria, lichens and mosses, as well as green algae, microfungi, and bacteria that grow in and on the surface of soils in open spaces in drylands around the world. Biocrusts provide important nutrients for plants and knit soils together to keep them from blowing away.

Biocrusts hide in plain sight, but once you've noticed them you'll start seeing biocrusts all over. The organisms in biocrusts come in many shapes and colors often growing in relatively small patches. Biocrusts vary from black patina-like coatings on smooth soils to red, yellow, or white scaly lichens that curl up from the surface or drab, grey patches of moss that become lush and green after a rain.

What Do Biocrusts Do?

Biocrusts contribute to ecosystem health in several ways including decreasing soil erosion and adding nutrients like nitrogen to the soil. The organisms in biocrusts help reduce erosion in different ways. When the soil is wet, cyanobacteria weave through the soil and secrete sugar residues, which help glue soil particles together. Lichens and mosses protect the soil surface and use small root-like structures to anchor to the soil.

Some cyanobacteria and lichens can fix nitrogen. That is, they can convert the nitrogen in the atmosphere to a form that is usable by plants. Many of the organisms in biocrusts photosynthesize and contribute carbon to the soil through leaching and decay.

Biocrust influences on water flow and availability to plants is likely important, but there is still much to learn. Their influence on hydrology likely depends on climate, soil,



Black lichen biocrusts swollen from the rain and grasses in northern Arizona

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CHERYL MCINTYRE

the kind of biocrust, the plants in the area, and the size of the area studied. Some biocrusts improve infiltration of water into the soil by increasing surface roughness. Biocrusts can also influence the nature of plant communities by catching seeds being moved across the soil surface by wind and water. We are also learning how seed shape and size and biocrust surface roughness might determine seed capture, germination and establishment and hence what plants occur on a site. However, once plants establish, biocrusts can enhance plant growth.

Disturbance and Recovery

Biocrusts are relatively delicate and sensitive to disturbance such as trampling or crushing, fire, and invasion of exotic plants. The type, timing, frequency and severity of disturbance, historic disturbances, and site characteristics determine how the biocrust community is affected. Although livestock grazing generally reduces biocrust functions, the effect of grazing likely depends on stocking rate, grazing season, and historic grazing practices. Following disturbance, biocrusts can take years to decades to fully recover. However, recent research has markedly improved our ability re-establish degraded biocrusts and is adding a new arrow to the rangeland restoration quiver.

Acknowledgements

Information compiled from Weber, B., B. Büdel, and J. Belnap (eds.). 2016. *Biological Soil Crusts: An Organizing Principle in Drylands*. Springer International Publishing, Cham.

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2012-38640-19581 through the Western Sustainable Agriculture Research and Education



Lichen biocrust in Southern Arizona

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