

Biocrust Capsules: New Medicine for Soil Restoration

Madeline Mayorga, Seth Charley, Anita Antoninka, Nelly McCuistion, Lydia Baily, Matt Bowker

Northern Arizona University, Flagstaff, AZ USA

Biological soil crust (biocrust) is a community of organisms, composed of mosses, lichen, and cyanobacteria, that form a living crust in and bind the top millimeters of mineral soils in dry and/ or cold ecosystems. This diverse community of organisms is essential in dryland ecosystems because they stabilize the soil through aggregation, promote soil fertility, and interact with vascular plants.

Biocrust faces many threats from climate change and land use and is predicted to decrease by 17%-30%. Land managers need restoration techniques to inoculate biocrust that are cost-effective, can be used on a large scale, and do not require maintenance. To meet management needs, we are testing biocrust capsules that can be dispersed widely and survive drought. We are exploring capsules which break down quickly or more slowly and are filled with biocrust collected from the field or grown in the greenhouse, with and without native seeds in a fully factorial greenhouse experiment with daily watering. We will monitor capsule breakdown and biocrust establishment daily for the first week, then biweekly for the remaining weeks. The biocrust establishment will be monitored using a pulse amplitude modulator, which will indicate photosynthesis. We hypothesize that biocrust capsules will promote establishment of biocrust and seeds, and we expect that greenhouse cultivated biocrust will do as well as field collected. If successful, this technique can be broadly used across degraded landscapes.

Contact Information: Madeline Mayorga, Post-Bacc Scholar, Northern Arizona University, School of Forestry, NAU School of Forestry, Flagstaff, AZ, 86011, USA, Phone: 928-523-2669, Email: madeline.mayorga@nau.edu or anita.antoninka@nau.edu