

TANNER HOFFMAN & EMBER MORRISSEY, Department of Biology, West Virginia University, Morgantown, WV, 26506. Extremophiles on the Red Planet: Investigating Biocrust Viability in Simulated Martian Soil.

Biological colonization of Martian regolith may improve soil properties relevant to life-support and in situ resource utilization (ISRU) strategies on Mars. Here we aimed to determine if extremophilic microbial biocrust communities derived from Earth's desert ecosystems can establish, persist, and function in Martian regolith. To address this goal, we conducted a laboratory microcosm experiment using Martian regolith simulant inoculated with biocrust communities collected from the American Southwest. To test the ability of nutrients to stimulate microbial growth, microcosms received one of three fertility treatments: no fertilization, phosphorus amendment, or phosphorus and nitrogen amendment. Microcosms were maintained in growth chambers under a 12 h light/12 h dark cycle. After one month, CO₂ flux was measured under light and dark conditions to estimate photosynthesis and respiration. Preliminary analyses have indicated photosynthetic activity in all biocrust inoculated mesocosms. Respiration rates were greatest in regolith inoculated with McDowell Nature Preserve biocrust followed by Organ Pipe National Monument and Mojave Desert inoculated regolith. Future work will aim to characterize the microbial communities present in the biocrusts as well as determine their genetic capabilities to reduce toxic salts into inert compounds and add nutrients and carbon into the regolith. In summary, the preliminary results demonstrate that biocrust microorganism can persist and function in Martian regolith, suggesting biocrust inoculation may stimulate soil formation on Mars.