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Development and Validation of Incubation Chambers to Manipulate Microbial Dispersal

Microbial dispersal is the process in which microbial communities move across space, away from their parent populations. This process influences the way microbial communities are structured and interact with other communities. Stainless steel meshes with varying pore size were used to physically control the dispersal of bacteria. A method to physically control and measure dispersal of bacteria was developed using Escherichia coli using meshes. These meshes were validated through inoculation of a bacterial culture inside the meshes and plating of solution that passes through the meshes. The meshes were then applied to microbial communities living in different soil types using 3D-designed, novel incubation chamber devices. In order to characterize and determine the change occurring within the communities, the 16S rRNA gene was amplified and sequenced in the microbial communities. Phylogenetic analysis was then conducted to provide the identity and proportion of bacterial species living in the respective microbial communities. This data allowed for the elucidation of microbial community change through the application of the microbial dispersal control method. Preliminary results suggest that the incubation chambers created an anaerobic environment during incubation. In future studies, these chambers must be designed allowing for an aerobic environment while maintaining sterility. The incubation chamber control method could prove practical for applications in measuring the influence of dispersal between different soil types on microbial community structure and function in future work.