Soilization of Sand Indicated by Photosynthetic Rate, Water Retention Rate, and Health of Plants

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Desertification, which is increasing at an alarming rate, imposes food insecurities for nations with huge desert areas and weakens ecosystems. Many methods, like sand fences, have been developed to combat desertification, but soilization is a relatively new approach aimed at slowing desertification, while providing crop yields. In previous studies, I experimented with 4 additives: Carboxymethylcellulose (CMC), Bentonite, mycorrhizal fungus, and lichen and monitored plant height and visual health during drought conditions to determine the most effective combination. Mycorrhizal fungus consistently showed beneficial plant health, along with the Bentonite-fungus combination. CMC, however, yielded no measurable benefit. My hypothesis in this study is that combinations of Bentonite with either mycorrhizal fungus or lichen impart greater plant health. My experimental approach was to record the height, Dark Green Index (DGCI), viability of harvested beans and apparent health of soybean plants that were planted in sand samples treated with individual and combinations of additives. One set of sand samples was freshly treated while the other was treated in the previous study and re-used. The results indicated that whereas the fresh treatment did have a significant advantage in terms of bean size, possibly due to nutrients added by the commercial Bentonite suspension, the sand treatments that had been treated the year before provided a significant increase in the DGCI, and plant height. This study suggests that the low-cost resources, Bentonite and either lichen or mycorrhizal fungus, could be added to desert land and impart long-lasting soilization needed to improve agriculture, food security, and resist desertification.

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