

Title : Screening of Cyanobacteria Capable of Growth in Perchlorate-Enriched Environments Under Simulated Martian Conditions.

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ABSTRACT

Cyanobacteria are promising microorganisms for various applications on Mars, serving as a source of food, fertilizer, oxygen, and biofuel. However, the high levels of perchlorates present on the Martian surface may significantly limit their growth. This research aims to investigate the survival capabilities of cyanobacteria under perchlorate-rich conditions, as this chemical compound can impact microbial growth and viability on Mars. The study focuses on selecting cyanobacterial strains capable of tolerating perchlorates to establish a foundation for cultivation in simulated Martian environments. Cyanobacteria were cultured in media containing magnesium perchlorate concentrations of 0.25-0.60% for 14 days, with growth, cell morphology, and changes in protein expression patterns monitored throughout the experiment. The results revealed that *Chroococcidiopsis* sp. C079 and *Gloeocapsa* sp. C034 can adapt and survive in environments with 0.60% perchlorate, a level consistent with Martian conditions. These findings reflect the potential of cyanobacteria to support life sustenance and oxygen production in future Mars exploration missions. Additionally, the study provides a framework for developing biological systems to cultivate microorganisms in simulated Martian environments, which could be applied to future space missions and the exploration of other planetary bodies.