Halophilic fungi isolated from hypersaline Bolivian Altiplano: Diversity and salt tolerance

Oral

Diversity and taxonomy of halophiles , Systematics and classification of halophilic microorganisms (Bacteria, Archaea, Fungi, Protists, and Viruses)

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Hypersaline environments of the Bolivian Altiplano, such as Laguna Colorada, Laguna Verde and Salar de Uyuni, represent some of the most extreme habitats on Earth. Due to intense evaporation, high UV radiation, large temperature fluctuations and a complex ionic composition, these ecosystems are exposed to multiple environmental stressors and high concentrations of different ions, such as sodium, magnesium, calcium, potassium and lithium. In particular Salar de Uyuni harbors one of the world's largest natural reserves of lithium chloride.

The combination of these ions and extreme physical conditions creates extreme environments, where microorganisms are simultaneously exposed to several abiotic pressures. In this study, we investigated the diversity of halophilic and halotolerant

fungi isolated from various hypersaline locations across the Bolivian Altiplano. Primary isolation was conducted on selective media supplemented with different salts (NaCl, $MgCl_2$, LiCl, $CaCl_2$, NaBr, $MgSO_4$) in order to assess fungal tolerance to specific ionic stressors.

Phenotypic characterization of the isolated strains included growth assessment, colony morphology, pigmentation and sporulation under different ionic stress conditions, offering insights into their physiological adaptations to environmental extremes. For taxonomic classification, we performed molecular analyses on the isolates using one or more genetic markers, including ITS, LSU, actin and beta-tubulin.

Among the isolates, we confirmed the presence of representatives of several known halotolerant genera, such as *Cladosporium*, *Aspergillus*, *Wallemia*, *Aureobasidium* and *Debaryomyces*. The isolates of the latter emerged as particularly interesting due to their high general halotolerance, and more specifically high tolerance to lithium. This led us to conduct whole-genome sequencing of these strains, that might represent a yet undescribed species within the genus *Debaryomyces*. Further analyses will focus on elucidating the mechanisms of halotolerance and the functional role of these strains in these stressed environments.

Our study contributes to a better understanding of fungal diversity and adaptation strategies in natural saline systems with high ionic loads. The results provide important insights for taxonomy, extremophile ecology and potential biotechnological applications.

Palabras Clave

(1) halophilic fungi, (2) Bolivia, (3) ionic stress, (4) Debaryomyces, (5) diversity.

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