



HaloProspecting: multigenomic and functional strategies for bioactive compound discovery

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Halophiles in food, agriculture, and human health , Potential medical and pharmaceutical applications of halophilic compounds

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Saline and hypersaline ecosystems harbor unique microbial communities that have adapted to thrive under high osmotic stress. The bioprospecting of halophilic microorganisms requires a multidisciplinary approach that spans from microbial ecology to the chemical identification of molecules of interest. By integrating ecological insights, genome-based predictions, and functional assays, the “HaloProspecting” framework highlights the potential of halophilic microorganisms as a sustainable source of novel bioactive compounds.

Some of these molecules have antimicrobial, antioxidant, and antitumoral activities, with several showing entirely new chemical structures, while others share features with compounds already known in pharmaceutical and agricultural markets. These findings open new avenues for the sustainable biotechnological exploitation of saline environments.

In this presentation, we will explore successful case studies that illustrate the importance of investigating the microbial diversity of hypersaline environments, the isolation of novel strains, and the preservation of natural microbial resources. Current tools and methodologies for genomic prediction, bioactivity testing, and chemical extraction and elucidation will be reviewed. Finally, future perspectives will be discussed, including a proposal to establish an international collaborative network focused on halophilic microorganisms for drug discovery.

Palabras Clave

(1) halophilic microorganisms, (2) bioprospecting, (3) genome mining, (4) bioactive compounds, (5) sustainable biotechnology.