

Halophiles and Halotolerant bacteria: Changes in fatty acid profile

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Bacteria are valuable to many industries due to their metabolic diversity and environmental plasticity. An example are halotolerant and halophilic bacteria, which survive at high salt concentration and have therefore become an alternative for the development of many industrial processes. Understanding how these microorganisms manage cell composition to adapt to changes in salt concentration is crucial to expand their use in different industrial and biotechnological processes. The present work aimed to study how salinity affects the fatty acid composition of bacterial strains isolated from Trindade Island. The microorganisms were subjected to successive transfers to Tryptic Soy Broth (TSB) containing increasing concentration of NaCl: 100, 150, 200, 240, 260, and 280 g L⁻¹. Parallel control experiments were conducted, in which the inoculum was directly transferred from NaCl L⁻¹ free TSB to the target saline concentration. To analyze the fatty acids profiles, an aliquot was taken from cultures at the lowest and highest NaCl concentrations tolerated by each bacterial strain. Fatty acid methyl ester were extracted and analyzed according to the protocol recommended by MIDI Inc. (Newark, USA). In all the bacteria analyzed, a presence of 16:0 fatty acids was detected. Furthermore, these bacteria exhibited an elongation of their fatty acid chains, consistent with prior studies involving species exposed to high salinity conditions. Previous research on high salinity environments has consistently demonstrated a reduction in the abundance of unsaturated fatty acids. In our study, this reduction was observed in *Halomonas* sp. 23%-S1B3 and 23%-S1B5 under control conditions at 150 g L⁻¹ salt concentration, and in 23%-S1B5 at 240 g L⁻¹ salt concentration, both in control and adaptation experiments. Conversely, an increase in unsaturated fatty acids was noted in *Bacillus glycinifermentans* 12%-S1C5, *Halomonas* sp. 23%-S1B3, and 23%-S1B5 during adaptation assays at 150 g L⁻¹ salt concentration. Furthermore, 23%-S1B5 exhibited an increase in unsaturated fatty acids at 240 g L⁻¹ salt concentration in the control experiment. Although the results show a change in fatty acid composition there was not a pattern for all strains. That observation shows that fatty acid evaluation is not sufficient to understand the behavior of bacteria under salt stress since the causes are multifactorial. Therefore more studies are needed in this area, evaluating other aspects of stress tolerance and adaptation in addition to fatty acid analysis for a greater understanding of these organisms relevant to different industrial sectors.

Key words: Saline stress, Halotolerant bacteria, Halophiles bacteria.

Bactérias halófilas e halotolerantes: mudanças no perfil de ácidos graxos

As bactérias halotolerantes e halófitas são utilizadas como modelos na agricultura devido à capacidade de sobrevivência em solos salinos. Sendo assim, o objetivo deste trabalho busca avaliar a mudança na composição de ácidos graxos de cinco linhagens após o cultivo em diferentes concentrações de NaCl. Para isso, as cadeias de ácidos graxos das bactérias que sofreram um processo de adaptação foram comparadas com aquelas que não sofreram. Ocorreu um aumento na cadeia de algumas linhagens, enquanto para outras houve uma diminuição. Portanto, são necessários mais estudos visto que este resultado pode ter acontecido por motivos fatoriais.

Palavras-chave: Estresse salino; Bactérias halotolerantes; Bactérias Halófilas