



## Optimization of production of Microbial Exopolysaccharides (EPS) with essential oils from two medicinal plants

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### ABSTRACT

**Objective:** The aim of our study is to evaluate the effect of essential oils of two medicinal plants: *Atriplex halimus* and *Haloxylon scoparium* on the production of EPS by four probiotic strains.

**Methodology and results:** Exopolysaccharides (EPSs) of lactic acid bacteria have potential for development and exploitation as food additives and functional food ingredients with both health and economic benefits. In this study, EPS production was carried at sucrose broth with different parameters (inoculum size, temperature, pH, incubation period, sucrose concentration, oxygen tension). In addition, under an optimized condition the effect of essential oils of two medicinal plants: *Atriplex halimus* (A.H.) and *Haloxylon scoparium* (H.S.) was evaluated on EPS production by four strains (*Leuconostoc sp.*, *Lactobacillus sp.* and two strains *Pediococcus sp.*). The production kinetics and exopolysaccharide yields were strongly dependent on the fermentation conditions. Physical factors such as temperature, pH and oxygen tension had a primordial importance. Conditions leading to higher levels of EPS production depends on strains and adequate concentrations of sucrose (50 g/l), pH (6,5 for *Leuconostoc sp.* and *Pediococcus sp.*, 2; 4,5 for *Lactobacillus sp.* and 5 for *Pediococcus sp.* 1, incubation period (18 hours), temperature (37°C from *Leuconostoc sp.* and *Pediococcus sp.* 1, 30°C from *Lactobacillus sp.*, 50°C from *Pediococcus sp.* 2) and medium of production (broth sucrose). The introduction of essential oils (150 µl) of tested plants improved the production of EPS from 7.9 – 9.73 mg/ml of all strains to 15.2 – 16.28 with essential oils of *Atriplex halimus* and 11.6-13.2 mg/ml with essential oil of *Haloxylon scoparium*. Results showed an important stimulation of the exopolysaccharides production by essential oils of two plants (A.H. and H.S.)

**Conclusion and Application of results:** Our strains have shown their ability to produce maximum levels of EPS in the case of the addition of essential oils extracted from medicinal plants. These substances can be used as additives in the food industry to increase the productivity of the lactic strains of EPS as well as in the pharmaceutical field to prepare some medications.

**Key words:** exopolysaccharides, optimization, essential oils, medicinal plants, Lactic Acid Bacteria.