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Exopolysaccharides from *Bacillus licheniformis*: Production, partial characterization and emulsifying activity

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Introduction

Microbial exopolysaccharides (EPSs) are soluble or insoluble polymers secreted by microorganisms. Due to their characteristic physical and rheological properties, EPSs are widely used in the food industry (as emulsifying, viscosifying, stabilizing or gelling agents), as well as bioflocculants, bioabsorbents, heavy metal removal agents, drug delivery agents, and others. Their antitumor, antiviral, immunostimulatory and anti-inflammatory activities are also proved. *Bacillus* spp. produce a variety of EPSs. Some of them have excellent properties, which makes them interesting for investigation of the potential use.

Aim

The aim of the present study was to compare growth and EPS production of *Bacillus licheniformis* in two different media, and to partially characterize isolated polysaccharides.

Material and methods

Strain of *Bacillus licheniformis* NS032 used in this experiment was isolated from petroleum sludge sample taken from Oil Refinery, Novi Sad. Fermentations were conducted in nutrient and sucrose broths. EPSs were isolated from media by centrifugation on 10000 rpm and precipitation with three volumes of ethanol. Monosaccharide composition was determined by paper chromatography, after total hydrolysis using 2 M trifluoroacetic acid. Emulsifying activity was determined as E₂₄.

Results

Obtained results showed that *Bacillus licheniformis* strain grows much better on nutrient medium than on sucrose medium. Growth maximum was attained at the third day of fermentation. In sucrose broth, EPS production reached 7 g/L, and this level was two fold higher than that obtained in nutrient broth. Crude polysaccharide preparations were built from fructose and glucose (EPS obtained from sucrose medium) or galactose, glucose and fructose monosaccharide units (EPS from sucrose medium) and exhibit high emulsifying activity compared with chemical surfactant.

Conclusion

Based on obtained results, it can be concluded that better medium for growth of *Bacillus licheniformis* strain is nutrient broth, while high concentrations of EPSs were achieved in sucrose broth. Significant emulsifying activity is the basis for further characterization of structure and makes them very useful in industrial and environmental applications.

Key words

Microbial growth, exopolysaccharides, emulsifying activity