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Optimization of culture conditions for the production of exopolysaccharides from marine isolate *Citrobacter* sp.

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ABSTRACT: Exopolysaccharide (EPS) samples were collected from the Mandapam camp, India. Morphological, biochemical characterization and 16S rRNA gene sequencing were done and the candidate bacterium was confirmed as *Citrobacter* sp. EPS production was observed from bacteria in Malt medium broth (0.88 ± 0.04mg/ml). The optimal cultural conditions for EPS production were as follows: after 72 hours of incubation at pH 8.0 (0.75 ± 0.1 mg/ml), the temperature at 40°C (0.75 ± 0.1 mg/ml), 100 rpm (0.90 ± 0.1 mg/ml). In the experimentation, arabinose (carbon sources) (1. ± 0.120 mg/ml) and ammonium nitrate (nitrogen) (1.30 ± 0.1 mg/ml) showed better results for the yield of EPS. The highest production of EPS was recorded in Triton X-100 (surfactants) supplemented medium. The optimal production of EPS was obtained in 2.5% sodium chloride added medium. Then the 2.5% inoculum concentration better for maximizing the yield of EPS. The best yield of EPS was noticed in after 96 hours of incubation time.

1. INTRODUCTION

EPS which are produced by microorganisms, are high-olecular-weight natural biopolymers composed of several kinds of sugar residues. Depending on the effect of ecological conditions, the structure and functional performance of microbial EPS might vary. For growth and development, several bacterial strains have the capacity to generate EPS. Characterization of EPS from *Lactobacillus* strains in cucumber and cabbage to assess the capacity for production (Singh et al., 2016). Numerous thermophilic bacteria, in addition to archaea, are efficient producers of significant quantities of EPS for industrial use. Potential bacterial strains from harsh climatic settings, such as *Bacillus thermantarcticus*, *Geobacillus thermodenitrificans*, and *Bacillus licheniformis*, have been identified and described for a variety of purposes. (Kambourova et al., 2009).

Many halophilic strains from Archaea and marine sediments, such as *Haloferax*, *Haloarcula*, *Halococcus*, *Natronococcus*, and *Halobacterium*, have been examined for their ability to produce EPS, according to some previous findings. The isolated bacterial strains were tested for EPS generation in the appropriate medium. Then, FTIR, HPLC, and GC-MS analyses were used to describe the screened bacterial strains. The instrumentation analysis was performed to look for different groups and sugar residues. (Shankar et al., 2021).

Since most EPS was produced during the log phase of the bacterium, the bacterial growth phase can generally have an impact on the production of EPS. Additionally, the main factor in bacterial development at the time of yield is the composition of the medium, namely the presence of carbon, nitrogen, and other mineral sources. Therefore, environmental factors like temperature and pH are crucial for the generation of yield. In addition, because they require a suitable quantity to consume food material in the medium, inoculum concentration usage is another important component of EPS output (Vuyst et al., 1999). Maheswari et al. (2020) studied the capacity of

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