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IMPROVED OIL RECOVERY BY USING BIOSURFACTANTS PRODUCED FROM BACILLI BACTERIA ISOLATED FROM OIL RESERVOIRS IN IRAQ

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ABSTRACT

Isolation of bacterial species from produced water of oil field and exhibited ability for biosurfactants production and then evaluate the efficiency of biosurfactants in improving oil recovery. Three bacterial species identified as *B. cereus* (M1), *B. cereus* (M2) and *B. licheniformis* (M3) were recovered from produced water of oil fiel. There was a significant reduction in surface tension by *B. cereus* (M1) 53 mN/m to 38 mN/m, *B. cereus* (M2) 35 mN/m and 32.9 mN/m for *B. licheniformis* (M3). The highest oil displacement of *B. cereus* (M2) was 40mm while *B. cereus* (M1) was the lowest rate. The strongest emulsification activity (100%) was for both M1 and M2, while the highest oil recovery in test tubes (25%) and beakers (52%) was by M1. The highest degradation rate was 66% *B. licheniformis* (M3) followed by 63% and 57% for *B. cereus* (M1) and *B. cereus* (M2) respectively. The GC analysis of crude oil n-alkanes showed that all species have biodegradation efficiency comparing with the control. The study showed a significant ability of these strains for producing biosurfactants that can apply for Microbial Enhanced Oil Recovery MEOR.

KEY WORDS: Bacilli bacteria, Biosurfactants, Microbial Enhanced Oil Recovery (MEOR).

INTRODUCTION

Growing attention has been given for microbial manipulation in field of biotechnology such as Microbial Enhanced Oil Recovery (MEOR) which is an alternate recovery method that conducts microorganisms and their metabolic products resulting in shifting use of common chemical and thermal ways to cost effective and eco-friendly methods (Bachmann *et al.,* 2014; Bezza and Chirwa, 2017). The microorganisms produced surface-active organic compounds when grown on water immiscible substrates that help to reduce surface and interfacial tension are called Biosurfactants (Batista *et al.,* 2006). Predominantly they are secreted either extracellular or attached to parts of cells during growth on water immiscible substrates, the substrate will be more readily available for uptake and metabolism because of the biosurfactants reduce the surface tension at the phase boundary (Desai and Banat, 1997). The biosurfactants have unique chemical structure that vary from glycolipids, phospholipids, polymeric and lipopeptides (Yin *et al.,* 2009; Makkar and Rockne, 2003). Specific microorganisms such *Acinetobacter sp.*, *Candida antartica* and *Bacillus sp.*, have to ability for biosurfactants production (Fakruddin, 2012). *Bacillus subtilis* has a certain importance in field of biotechnology and MEOR due to their ability in producing a wide range of metabolites including enzymes, antibiotics, amino acids, insecticides, biopolymers, bacteriocins and biosurfactants (Perez

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