Surfactants Efficiency on Pentachlorophenol Contaminated Wastewater Enhanced by *Pseudomonas Putida* AJ 785569

rim werheni Ammeri (✉ rim.werheni@gmail.com)

CERTE: Centre de Recherche et des Technologies des Eaux de Borj Cedria <https://orcid.org/0000-0003-3712-1386>

yassin hidri

Olive University

WAFA HASSRN

University of Monastir Higher Institute of Arts and Crafts of Mahdia: Universite de Monastir Institut Supérieur des Arts et Metiers de Mahdia

ines mehri

certe

Nesrine khelifi

CERTE: Centre de Recherche et des Technologies des Eaux de Borj Cedria

abdenaceur Hassen

CERTE: Centre de Recherche et des Technologies des Eaux de Borj Cedria

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Abstract

This study has objectives to assess the effects of some surfactants on (1) the bacterial growth, (2) PCP (800 mg L^{-1}) rate removal, and at last (3) biofilm development. Three different surfactants are used in this case as anionic (SDS), no anionic Tween 80 (TW80) and cationic (CTAB). The results improve that there was an adsorption of PCP by the bacterial cells of around $30 \text{ mg} \cdot \text{L}^{-1}$ and PCP removal of around 720 mg L^{-1} after seven days. It appeared that the surfactant adding affected the bacterial growth and reach a maximum of PCP removal with SDS addition with a value 676.66 mg L^{-1} in S.WW then CTAB and TW80. Biofilm formation in BHI with PCP showed a clear acceleration and enhancement of this activity with SDS addition. Besides, biofilm morphotype of selected strain appeared affected in form, density, and colour after different situations of stress caused by various surfactants or PCP.

Full Text

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Figures

Figure 1

PCP (800 mg L⁻¹) removal by *P. putida* AJ 785569 (A) in MSM in the supernatant (a) and adsorbed 455 (a), HPLC Chromatograph example at 30°C at first and seven days (B) of bioaugmentation treatment in MSM.

Figure 2

Evaluation of the bioaugmentation process of the *Pseudomonas* strain in the MSM and EUS by 462 monitoring the concentration of PCP (800 mg L⁻¹) after 7 days at 30°C. SDS: sodium dodecyl sulfate; CTAB: 463 Bromure d'hexadécyltriméthyl ammonium; TW 80: Tween 80; PCP: Pentachlorophenol

Figure 3

Monitoring of the chloride concentration (free chlorine) measurement (mg L⁻¹) for each *Pseudomonas* 469 strain on the five treatments for seven days at 30°C in sterile wastewater and MSM. SDS: sodium dodecyl 470 sulfate; CTAB: Bromure d'hexadécyltriméthyl ammonium; TW 80: Tween 80; PCP: Pentachlorophenol

Figure 4

Monitoring of microbial growth in MSM (A) and wastewater (B) of exogenous *Pseudomonas* strains 477 on the five bioaugmentation treatments at a T 30°C and for 7 days at 150 rpm. SDS: sodium dodecyl sulfate; 478 CTAB: Bromure d'hexadécyltriméthyl ammonium; TW 80: Tween 80; PCP: Pentachlorophenol

Figure 5

Principal component analysis of surfactant effect in bioaugmentation of PCP contaminated 483 wastewater. 484 SDS: sodium dodecyl sulfate; CTAB: Bromure d'hexadécyltriméthyl ammonium; TW 80: Tween 80; PCP: 485 Pentachlorophenol; Chlo: chloride; MSM: mineral saltmedium; BB: bacterial biomasse.

Figure 6

Example of biofilm formation in BHI agar medium artificially contaminated by PCP (100 mg. L⁻¹) 489 supplemented with CRA and 20 mg. L⁻¹ surfactant (SDS, CTAB, and TW 80) at 30°C during. SDS: sodium 490 dodecyl sulfate; CTAB: Bromure d'hexadécyltriméthyl ammonium; TW 80: Tween 80; PCP: 491 Pentachlorophenol.

Figure 7

PCP effect in biofilm development at 100 mg. L⁻¹ concentration and surfactant presence SDS, Tween 80, and 496 CTAB (20 mg. L⁻¹) after 24 hr of incubation at 28°C. Different lower case letters indicate significant differences among treatment, at Duncan post-hoc test ($p < 0.01$)

Supplementary Files

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