EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

CONCEIVING WASTEWATER TREATMENT IN 2020 (Water_2020)

COST-STSM-ES1202-21375

COST Action ES1202

Short Term Scientific Mission (STSM) 2014

Utilization of wastewater for the production of Extracellular Polysaccharides (EPS) by bacteria

October 6th , 2014 | November 28th , 2014

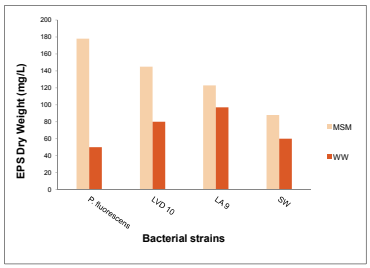
Objectives

1. Detection and selection of bacterial strains that produce EPS.
2. Tolerant strains that grow in wastewater and in addition to be able to produce EPS.
3. Extraction and quantitative measurements of EPS.
4. Quantitative analysis of protein and carbohydrate content of EPS

Methodology

1. A pre-screening qualitative method for the selection of potential EPS producers was carried out according to Subramanian *et al.* 2010, where strikes of the pure strains were carried out onto Plate Count Agar (PCA) and Sabouraud's dextrose agar (SDA) media. All seven strains were potential producers of EPS according to that method, although only four showed high production. The selected strains were *Enterobacter ludwigii* LA9, *Pseudomonas aeruginosa* LVD-10 and *Lelliottia amnigena* SW. The bacterial strains *Rhodococcus ruber* and *Pseudomonas fluorescens* were used for positive control.
2. Examination of EPS production in liquid cultures that were contained 25 g/L glucose and examination of EPS production in wastewater.
3. EPS extraction according to Bezawada *et al.,* 2013 and dry weight measurements.
4. EPS characterisation of the protein and carbohydrate content, using the Lowry (Lowry *et al*. 1951), and Anthrone (Trevelyan *et al*. 1952), methods, respectively.
5. Carbon Oxygen Demand measurement of the wastewater before treatment with the bacterial strains and after.

Results



	MSM				WW			
Bacterial Strains	Protein Concentration (mg/L)	Protein content (mg BSA/g EPS)	Carbohydrate Concentration (mg/L)	Carbohydrates content (mg glucose/ g EPS)	Protein Concentration (mg/L)	Protein content (mg BSA/g EPS)	Carbohydrates Concentration (mg/L)	Carbohydrates content (mg glucose/ g EPS)
Pseudomonas fluorescens								
LB	5	37.5	200	848	5.7	93.4	3	22.5
TB	2	44.4	9	200	5.7	126.7	0	0
Pseudomonas aeruginosa LVD-10								
LB	6	47.62	230	987	6	47.6	5	39.7
TB	2	105.3	5	263.2	8	19	2	105
Lelliottia amnigena SW								
LB	3	36.73	140	714	4	49	0	0
TB	2	300	10	800	4	600	0	0
Enterobacter ludwigii LA 9								
LB	6	58.1	200	989	8	77.4	5	48.4
TB	1	50.0	9	450	5	250	0	0

1. EPS production in mineral salt (MSM) medium compared to wastewater (WW) in 72 h (on the left). The strain LA9 showed only slight reduction of EPS production in WW compared to MSM.

2. The protein and carbohydrate content of the LB- and TB-EPS by each bacterial strain (table on the right).

3. The COD of the wastewater reduced from 266 mg/L to zero.

Highlights

The main objectives were achieved successfully, since the tested bacterial strains showed to be EPS producers. The three strains (*Enterobacter ludwigii* LA 9, *Lelliottia amnigena* SW and *Pseudomonas aeruginosa* LVD-10) that were tested in wastewater were able to tolerate wastewater and achieved complete mineralization, since the COD was reduced from 266 mg/L to zero within 72 hours.

Earth System Science and Environmental Management (ESSEM)

Researcher

Efi-Maria Drakou

Cyprus University of Technology, Cyprus

Host Institution

Department of Biotechnology

Catholic University of Porto, Portugal

Responsable: Prof. Paula Castro

Contact details

Chair of the Action
Prof. Juan M. Lema
Professor of Chemical Engineering
Univ. Santiago de Compostela, Spain
Juan.Lema@usc.es

STSMs Manager
Prof. Peter Schröder
Helmholtz Zentrum Muenchen, Germany
peter.schroeder@helmholtz-muenchen.de

Website
www.water2020.eu

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