ANTIFOULING POTENTIAL OF BACTERIAL EXOPOLYMERS

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Introduction. Biofouling is the settlement and accumulation of living organisms on artificial surfaces in contact with seawater. This process causes breakdowns in the performance of underwater structures, such as shipping, petroliferous platforms, pipelines, fishing nets and bridge pillars (1). A variety of toxic materials (e.g. copper, lead, mercury, arsenic, tin) have been successfully used to control biofouling. However, they were prohibited because of their negative impacts to ecosystem. A greener control strategy has focused on the chemical defenses of sessile marine microbial communities. Marine bacteria produce extracellular polymeric substances (EPS) that can inhibit biofouling (2).
In this work, antifouling potential of EPS secreted by two marine bacteria, *Bacillus mojavensis* MC3B-22 y *Microbacterium* sp. MC3B-10 were tested.

Methods. The strains were grown under two culture conditions: roller bottle and shake flasks. The EPS were extracted at the end of the fermentations and their biomolecular composition was determined. The antifouling test was carried out using circular coupons of different materials (aluminum, stainless steel, fiberglass and polyethylene). The coupons were coated with EPS solutions (5% and 10 %) and then, were submerged in seawater (collected from Campeche bay) for 5 days. At the end, coupons were recovered and microbial colonization was evaluated by determining dry weight, carbohydrate and protein content.

Results. Growing conditions influenced the EPS production and their biomolecular composition. The strain *Microbacterium* sp. MC3B-10 synthesized more EPS in shake flask, while the strain *B. mojavensis* MC3B-22 was better in roller bottle. The biomolecular composition of all EPS obtained is showed in the table 1. It has been reported that many factors (e.g. nutrient availability, culture conditions, and physicochemical parameters) influence the production and chemical composition of EPS secreted by bacteria (3).

Table 1. Biomolecular composition of EPS

Strain	Culture conditions	Carbohydrates	Proteins	Lipids
Microbacterium sp.	SF	53±0.3	38±2	8±0.3
	RB	42±0.	11±0.6	7±0.4
B. mojavensis	SF	30±0.7	14±1.1	7±0.1
	RB	58±0.5	2.2±0.2	7±0.1

SF=Shake Flask, RB=Roller Bottle

On the other hand, the antifouling test showed that colonization on stainless steel coupons was inhibited by EPS solutions of *B. mojavensis* cultured in roller bottles (Fig. 1).

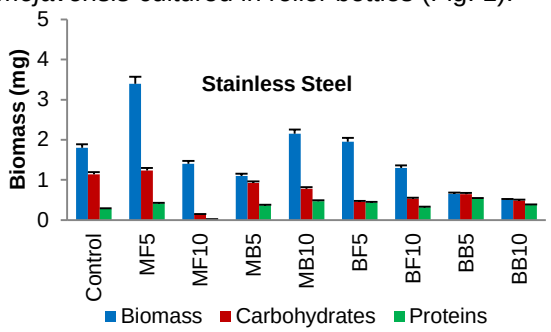

Fig. 1 Antifouling effect of EPS on stainless steel coupons.

Conclusions. The strains *B. mojavensis* MC3B-22 y *Microbacterium* sp. MC3B-10 produced EPS whose biomolecular composition was influenced by culture conditions. The EPS presented antifouling properties over plastic and metallic surfaces.

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