ISOLATION OF BROAD ANTIFUNGAL LIPOPEPTIDES DERIVED FROM THE MARINE BACTERIUM *Bacillus mojavensis* MC6B-22

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Introduction. The habitat marine represents a still untapped source of natural products of varied origin. Ecological adaptation of marine microorganisms leads to the production of metabolites such as antibiotics, antioxidants, bioemulsifier, biosurfactant, enzymes and other valuables compounds of commercially importance. Lipopeptidic biosurfactants are important molecules as they express biological activities including antibiotics, antifungal, insecticides, immunomodulatory and antitumor. Currently their more than 100 described lipopeptides isolated from different species of the genus *Bacillus* as the families of surfactins, iturins and fengycins (1). Therefore the aim of this work was isolate the antifungal biosurfactant produced by the bacterium *B. mojavensis* MC6B-22 isolated from a marine biofilm.

Methods. *B. mojavensis* was grown in liquid culture Luria Bertani Miller (LBM) at 25°C, and 140 rpm in a rotary shaker (84 h). After this time of fermentation, the biosurfactant was precipited with hydrochloric acid. The pellet obtained was adjusted to pH 7, and lyophilized. The antifungal activity was evaluated by minimum inhibitory concentration and minimum fungicidal concentration against 10 strains of pathogenic fungi. The crude extract was analyzed by thin layer chromatography (TLC) and high performance liquid chromatography (HPLC) to detect and identify the biosurfactants lipopeptides (2).

Results. Both highest yield and antifungal activity displayed by the biosurfactant were recorded at 84 hours of incubation in LBM medium. Lipopeptides presented a broad-spectrum antifungal, inhibiting the growth of the tested phytopathogens, although at different ranges (Table 1).

TLC and HPLC analysis showed that antifungal mixture of lipopeptides corresponded to surfactin and iturin (Fig. 2), from which iturin dominated in the profile.

Table 1. Activity of the biosurfactant against diverse fungal phytopathogens.

Fungal	Reported disease	Lipopeptide			
		Inhibition (mm)	MIC (µg/mL)	MFC (µg/mL)	Antifungal test
Fusarium nivale	Fusariosis	17	25	25	
Ascochyta sp.	speckled leaf blotch	24	6.25	6.25	
Curvularia sp.	Leaf spot	27	100	ND	
Colletotrichum gloeosporioides	anthracnose	27	3.13	12.5	
Colletotrichum gloeosporioides	anthracnose	28	6.25	12.5	
Colletotrichum gloeosporioides	anthracnose	22	6.25	6.25	
Colletotrichum capsici	anthracnose	24	12.5	12.5	
Colletotrichum acutatum	anthracnose	20	12.5	12.5	
Pestalotiopsis maculans	Leaf spot	26	25	ND	
Monilia sp.	moniliasis	34	25	25	
Alternaria sp.	blight of potato	17	50	200	

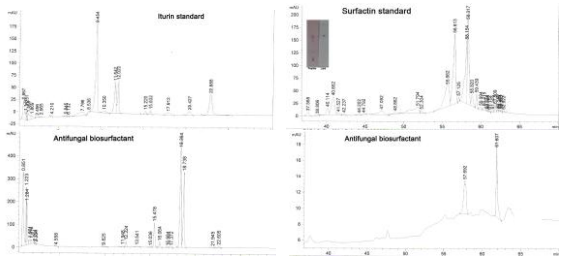

Fig. 2 HPLC analysis of the biosurfactant and standards lipopeptides.

Conclusions. *B. mojavensis* (MC6B-22) produced the surfactin and iturin at 84 hours of incubation in LBM medium. These lipopeptides presented a broad antifungal spectrum against of diverse fungal phytopathogens and may thus be used for preharvest and postharvest of crops either as formulations of pure lipopeptides or as a mixed bacterium-lipopeptide formulation.

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