

Control of postharvest fungal pathogens in pome fruits by lipopeptides from a *Bacillus* sp. isolate SL-6

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Abstract

Considering the economic losses in the fruit processing industry caused by phytopathogenic diseases, *Bacillus* sp. SL-6 was isolated from freshwater samples of the Cruz de Piedra Reservoir (San Luis, Argentina) and selected for its antifungal activity against *Penicillium expansum*, *Botrytis cinerea* and *Alternaria alternata*. These fungi are recognized as the main causal agents of postharvest diseases of pome fruits in Argentina. Pears are an important export product while apples are one of the fruits that lead internal commercialization throughout the country. Morphological, biochemical and phylogenetic analyses clustered strain SL-6 with *Bacillus velezensis*. To unveil the antimicrobial activity of this strain, gene fragments from the biosynthetic pathway of three lipopeptide families, surfactin, iturin and fengycin, were amplified by PCR and its expression assessed by RT-PCR. Cell-free supernatant from batch culture displayed inhibition only against *A. alternata* and *B. cinerea*. Partial purification of lipopeptides in the methanolic extract retained all antagonistic activities and fengycin was detected as responsible for the antifungal activity by TLC-bioautography assay. During short storage at room temperature, disease incidence and severity reduction in apples provided values of 59 and 67% against *B. cinerea*, respectively. The appearance of rot symptoms caused by *A. alternata* challenge was delayed in comparison with non-treated control, yielding total protection after 21 days of storage. Medium-term storage under cold conditions significantly reduced infection rates by *B. cinerea* in pears, with values higher than 80%. Four fengycin A and two fengycin B homologues were identified as active compounds by MALDI TOF and LC-ESI-MS/MS analyses. Successful curative protection by lipopeptides-enriched extract is a promising result for the further development of a biocontrol by-product as an alternative method for prevention of these pome fruit postharvest diseases.