

**Title** Bacteria colonizing melon fruit surface act as biocontrol agents to postharvest disease pathogens.

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### Abstract

The present study was conducted to select antagonistic bacteria that superficially colonize melon fruits and to clarify their suppressive functions against fungal pathogens, aiming at developing practical biocontrol agents for post-harvest diseases of melon fruits. Bacteria colonizing melon fruits were obtained by printing fragmented pericarps onto LB culture medium. Antifungal activity was screened by pair-culturing with fungal pathogens, and identified on the basis of DNA sequence alignments and conventional bacterial characteristics; one was identified as *Bacillus amyloliquefaciens* EXWB3, and the others *B. subtilis* EXWB1, EXWB2 and EXWB4. Four isolates expressed significant antifungal activity to eight postharvest pathogens, *Botrytis cinerea*, *Alternaria alternata*, *Fusarium oxysporum*, *Aspergillus niger*, *Trichothecium roseum*, *Penicillium* sp. and *Cladosporium* sp. Of the antagonistic isolates tested, EXWB1 was most effective, suppressing conidial germination of *B. cinerea*, *A. alternata* and *F. oxysporum* and inducing darker cell walls and abnormal conidial shape. The isolate secreted some bio-surfactants, which helped the sprayed bacteria to stick to the hydrophobic fruit surface. Melon fruits treated with EXWB1 retained high levels of sugar, vitamin C and organic acids even after inoculation with *A. alternaria* and *F. oxysporum*. Additionally, EXWB1-26 treatment suppressed the respiration increase and ethylene production that were typical in pathogen-inoculated fruits, and limited both fungal growth and expansion of the necrotic lesions produced by pathogen inoculation. Thus, the present study provides a promising biological agent to suppress fungal pathogens causing postharvest market diseases of fruit crops.