Title Involvement of fengycin-type lipopeptides in the multifaceted biocontrol potential of *Bacillus subtilis*

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Citation Applied Microbiology and Biotechnology 69 (1): 29-38. 2005.

Keywords Bacillus subtilis; biological control

Abstract

In this work, the potential of *Bacillus subtilis* strain M4 at protecting plants against fungal diseases was demonstrated in different pathosystems. We provide evidence for the role of secreted lipopeptides, and more particularly of fengycins, in the protective effect afforded by the strain against damping-off of bean seedlings caused by *Pythium ultimum* and against gray mold of apple in post-harvest disease. This role was demonstrated by the strong biocontrol activity of lipopeptide-enriched extracts and through the detection of inhibitory quantities of fengycins in infected tissues. Beside such a direct antagonism of the pathogen, we show that root pre-inoculation with M4 enabled the host plant to react more efficiently to subsequent pathogen infection on leaves. Fengycins could also be involved in this systemic resistance-eliciting effect of strain M4, as these molecules may induce the synthesis of plant phenolics involved in or derived from the defense-related phenylpropanoid metabolism. Much remains to be discovered about the mechanisms by which *Bacillus* spp suppress disease. Through this study on strain M4, we reinforce the interest in *B. subtilis* as a pathogen antagonist and plant defense-inducing agent. The secretion of cyclic fengycin-type lipopeptides may be tightly related to the expression of these two biocontrol traits.