Biocontrol ability and action mechanism of *Bacillus halotolerans* against *Botrytis cinerea* causing grey mould in postharvest strawberry fruit

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Abstract

Bacillus species are promising agent for the biological control of postharvest diseases. This study investigated the bio-control efficiency of *Bacillus halotolerans* KLBC XJ-5 against grey mould caused by *Botrytis cinerea* in postharvest strawberries, together with its underlying antagonistic mechanism. Treatment with *B. halotolerans* KLBC XJ-5 controlled mycelial growth as well as conidial germination of *B. cinerea* in vitro. The grey mould in strawberries inoculated with *B. halotolerans* KLBC XJ-5 was lower in comparison with that in the control fruit after 4 d of incubation. Genome sequencing and further bioinformatic analyses suggested that strain KLBC XJ-5 harboured six antimicrobial biosynthesis gene clusters, besides four glycoside hydrolase family 18 gene clusters involved in chitin degradation. In addition, it secreted the lytic enzyme chitinase (CHI). *B. halotolerans* KLBC XJ-5-treated strawberries exhibited significant induced enzyme activities (polyphenol oxidase, phenylalanine ammonia lyase, β-1, 3-glucanase, and chitinase) and compounds related to disease resistance (total phenols, flavonoids). Compared to the control fruit, *B. halotolerans* KLBC XJ-5-treated fruit did not present differences on nutritional quality (measured in ascorbic acid, titratable acidity, and total soluble solids). Thus, it can be concluded that *B. halotolerans* KLBC XJ-5 could be potentially useful as a suitable bio-control agent in harvested strawberries.