

**Title** Biological control of postharvest diseases by *Pantoea agglomerans* 59-4 on garlic bulbs  
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### Abstract

To screen for potential biocontrol agents against the postharvest disease of garlic caused by *Penicillium hirsutum*, a total of 1292 isolates were isolated from the rhizosphere or rhizoplane of *Allium* species. From these the S59-4 isolate was selected as a potential biocontrol agent when using an *in vivo* wounded garlic bulb assay. When the spore suspension ( $10^5$  spores/ml) of *P. hirsutum* was co-inoculated with a cell suspension of S59-4 ( $10^8$  cfu/mL) isolate on wounded garlic, the isolate showed a highly suppressive effect on disease development. The isolate was identified as the bacteria *Pantoea agglomerans* (Pa59-4) through use of the Biology system, the MIDI system and 16S rDNA analysis. In order to investigate the population dynamics of Pa59-4 on the application site of garlic cloves, two antibiotic markers, pimaricin and vancomycin (25 mg/ml) were selected. Bacterial density of Pa59-4 on wounded garlic cloves increased continuously both under room temperature and low temperature conditions until 30 days after application. On intact garlic cloves density of Pa59-4 increased until 15 days after application and thereafter decreased continuously. The culture media selected for mass-production of Pa59-4 were LB and TSB media, were selected. A by-product of the bio-fungicide formulated by mixing white carbon and bacterial culture filtrates of Pa59-4, suppressed growth of garlic blue mold by 40 to 50%. In addition, Pa59-4 showed *in vitro* inhibitory effects against various postharvest disease of citrus fruits, apples, onions, lettuces and carrots. In particular Pa59-4 showed strong inhibitory effects against *Penicillium digitatum*, *Aspergillus niger*, *Sclerotinia sclerotiorum* and *Geotrichum candidum*.