Suppression of fruit decay and maintenance of storage quality of litchi by *Photorhabdus luminescens* Hb1029 treatment

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Abstract

Photorhabdus luminescens Hb1029, a nematode symbiotic bacteria, has been found to control litchi fungus disease in vitro, but very limited information is available about fruit postharvest. Litchi fruits cv. Guiwei were treated with 10^8 CFU mL^{-1} *P. luminescens* suspension or sterile water as the control and stored at 25±1 °C with 40%–50% relative humidity. The changes in fruit decay, quality maintenance, defense-related enzyme activities and those involved in reactive oxygen species (ROS) were monitored. The results showed that *P. luminescens* effectively repressed fruit decay, mainly expressed as a significant reduction in browning index and weight loss. Meanwhile, litchi treated with *P. luminescens* maintained higher total soluble solids, titratable acidity, total soluble sugars and vitamin C compared to the control. Moreover, *P. luminescens* treatment enhanced the defense enzyme activities (peroxidase, superoxide dismutase and catalase) and induced a significant increase in trehalose content in fruit pulp while a significant decrease in malondialdehyde (MDA), hydrogen peroxide (H_2O_2) accumulations in pericarp. These findings indicated that, the application of *P. luminescens* enhanced the defense-related mechanism and non-enzymatic antioxidant system (trehalose, MDA, ROS and H_2O_2) of litchi against fruit decay.