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# Novel mixed fermentation of bio-control microorganisms treatment agent for suppressing kiwifruit bacterial canker disease associated with soil microflora alterations

Yunzhe Cong

Shandong University, China

**B**acterial canker of kiwifruit caused by *Pseudomonas syringae* pv. *actinidiae* (Psa), is a devastating disease of kiwifruit production due to its fast spread strong pathogenicity and difficult to control, the disease has seriously hampered the development of kiwifruit industry. The application of a novel treatment agent based on mixed fermentation of bio-control microorganisms, including *Trichoderma pseudokoningii*, *Rhizopus nigricans*, *Bacillus amyloliquefaciens*, as a strategy for controlling bacterial canker and its effects on soil microflora was investigated in a field with serious disease incidence in this study. The results showed that the pH value of the soil by the treatment (5.42) of mixed fermented liquid was lower than the control group (6.53) and the soil bulk density reduce from 1.52g/cm<sup>3</sup> to 1.46 g/cm<sup>3</sup> after processing. Real-Time PCR results showed that the total bacterial and fungal numbers were significantly decreased after treatment and that significantly fewer pathogens were observed. The next-generation sequencing of the 16S rRNA and internal transcribed spacer (ITS) genes using HiSeq platform showed that the soil bacterial and fungal community structures in the treatment were significantly different from the control without treatment. Compared to the control, higher abundances of *Ascomycota* and *Basidiomycota*, and lower abundance of *Glomeromycota*

and *Neocallimastigomycota* were observed in the processed soils. While, we also found the relative abundance of *Proteobacteria* and *Firmicutes* were higher in the processed soils and the *Acidobacteria*, *Planctomycetes* and *Nitrospirae* were lower. Most importantly, the abundance of *Pseudomonas syringae*, which includes the pathogen potentially responsible for bacterial canker of kiwifruit, was significantly lower in the fumigated soils after harvest. In conclusion, the observed disease suppression due to the novel mixed fermentation treatment strategy may be attributed to general suppression resulting from altered soil properties and the alteration of the disturbed soil microflora in a kiwifruit monoculture system.

## Biography

Yunzhe Cong a PhD student in Shandong University, Shandong, China. Major in Biochemistry and Molecular Biology and specialized in biocontrol. He is actively involved in Screening of bio-control microorganisms, development and application of biocontrol agent. His major area of research is effects of biocontrol agents on pathogenic microorganisms, soil microflora and crops. As the major participant, he participated in several national and provincial projects in Development and utilization of biocontrol agents.

congyunzhe@foxmail.com