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A dark septate endophyte *Veonaeopsis simplex* Y34 alters the root-endospheric community and suppresses Fusarium crown and root rot disease of tomato

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Fusarium crown and root rot (FCRR) of tomato caused by *Fusarium oxysporum* f. sp. *radicis-lycopersici* (FORL) is a common disease in worldwide. Our previous study showed the suppressive role of a dark septate endophyte *Veonaeopsis simplex* Y34 against Fusarium disease of Chinese cabbage, suggesting a potential bio-control agent to suppress FCRR of tomato. The aims of this study was to: 1) examine the suppressive potential of *V. simplex* Y34 against the FCRR of tomato; 2) explore the effect of *V. simplex* Y34 on root-endospheric community and how such effect links to the suppression of the disease. Two cultivars of tomato, House-momotaro and sicily-anrujo, were used in this experiment. The solid-cultures of *V. simplex Y34*, was applied in a nursery pot to assess the bio-control of the disease. Results showed that *V. simplex Y34* decreased the disease severity of FCRR for the two cultivars. The colonization of *V. simplex* Y34 in root was determined by re-isolation and T-RFLP profiles targeting fungal ITS-LSU region. Moreover, the application of the endophyte increased the diversity and evenness of fungal community in root-endosphere and decreased the colonization of FORL in the root. NMDS analysis of T-RFLP profiles showed that the fungal communities in root-endosphere with inoculation of *V. simplex Y34* were clustered away from those of non-inoculation, suggesting a correlation between the root-endospheric community and disease incidence. In conclusion, this study indicates that the application of *V. simplex* Y34 altered the diversity, evenness and structure of root-endospheric fungal community by the endosymbiosis of endophyte, and decreased pathogen colonization in the root, which opens up a new way to control of tomato FCRR disease. This work was supported by Council for Science, Technology and Innovation (CSTI), Cross-ministerial Strategic Innovation Promotion Program (SIP), “Technologies for creating next-generation agriculture, forestry and fisheries”.