Article

A Microbiological Approach to Alleviate Soil Replant   
Syndrome in Peaches

Derek R. Newberger 1, Ioannis S. Minas 1, Daniel K. Manter 2 and Jorge M. Vivanco 1,\*

1 Department of Horticulture and Landscape Architecture, Colorado State University, Fort Collins, CO 80523, USA; derek.newberger@colostate.edu (D.R.N.); ioannis.minas@colostate.edu (I.S.M.)

2 Agricultural Research Service, United States Department of Agriculture, Fort Collins, CO 80526, USA; daniel.manter@usda.gov

|  |
| --- |
| **Citation:** Newberger, D.R.; Minas, I.S.; Manter, D.K.; Vivanco, J.M. A Microbiological Approach to Alleviate Soil Replant Syndrome in Peaches. *Microorganisms* **2023**, *11*, 1448. https://doi.org/10.3390/ microorganisms11061448  Academic Editors: Alessio Mengoni and Roberto Defez  Received: 19 April 2023  Revised: 23 May 2023  Accepted: 24 May 2023  Published: 30 May 2023  A grey and black sign with a person in a circle  Description automatically generated with low confidence  **Copyright:** © 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/). |

**\*** Correspondence: j.vivanco@colostate.edu; Tel.: *+*1-970-491-7170

**Abstract:** Replant syndrome (RS) is a global problem characterized by reduced growth, production life, and yields of tree fruit/nut orchards. RS etiology is unclear, but repeated monoculture plantings are thought to develop a pathogenic soil microbiome. This study aimed to evaluate a biological approach that could reduce RS in peach (*Prunus persica*) orchards by developing a healthy soil bacteriome. Soil disinfection via autoclave followed by cover cropping and cover crop incorporation was found to distinctly alter the peach soil bacteriome but did not affect the RS etiology of RS-susceptible ‘Lovell’ peach seedlings. In contrast, non-autoclaved soil followed by cover cropping and incorporation altered the soil bacteriome to a lesser degree than autoclaving but induced significant peach growth. Non-autoclaved and autoclaved soil bacteriomes were compared to highlight bacterial taxa promoted by soil disinfection prior to growing peaches. Differential abundance shows a loss of potentially beneficial bacteria due to soil disinfection. The treatment with the highest peach biomass was non-autoclaved soil with a cover crop history of alfalfa, corn, and tomato. Beneficial bacterial species that were cultivated exclusively in the peach rhizosphere of non-autoclaved soils with a cover crop history were *Paenibacillus castaneae* and *Bellilinea caldifistulae*. In summary, the non-autoclaved soils show continuous enhancement of beneficial bacteria at each cropping phase, culminating in an enriched rhizosphere which may help alleviate RS in peaches.