

Identification of bacterial endophytes of interest for coffee crop in Vietnam¹

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RATIONALE

This project aimed to identify some plant growth promoting agents, as well as some biocontrol agents of coffee parasitic nematodes and fungal pathogens based on bacterial endophytes naturally associated with coffee roots and seeds in Vietnam. Bacteria were identified and selected with *in vitro* screenings for some potential plant growth promoting and biocontrol capacities. Subsequently, direct confrontations with the plant parasitic nematodes *Radopholus duriophilus* and *Pratylenchus coffeae*, as well as the phytopathogenic fungus *Fusarium oxysporum* were performed in order to highlight the bacterial endophytes nematicidal and antifungal activities.

METHODS

Bacterial endophytes were identified by sequencing of the 16S rRNA coding gene and preliminary screenings for phosphate solubilization, as well as the production of siderophores, hydrogen cyanide, gelatinases, chitinases, lipases and esterases were performed *in vitro*. Then, 50 bacterial isolates were selected for *in vitro* direct confrontations with the nematodes and the phytopathogenic fungus. After 48 h, *R. duriophilus* mortality risk ratios (percentage of mortality in treatment divided by percentage of mortality in control) were calculated. Then, isolates with risk ratios higher than 2 were further characterized with different concentrations in order to calculate lethal doses on *R. duriophilus* and *P. coffeae* at 24 h. Finally, dual cultures were used to highlight the antifungal activity of the isolate on *F. oxysporum* (expressed in percentage of fungal growth inhibition).

RESULTS

Fifty isolates were selected after the *in vitro* preliminary screenings for direct confrontation plant parasitic nematodes and the fungal phytopathogen. Seventeen isolates displayed *R. duriophilus* mortality risk ratios higher than 2 after 48 h of which 11 were tested at different concentrations at 24 h on both *R. duriophilus* and *P. coffeae*. Finally, 17 isolates displayed an antifungal activity on *F. oxysporum* with a growth inhibition comprised between 8 % and 50 %. The results for all the screenings are presented.

CONCLUSIONS & PERSPECTIVES

Several have displayed some nematicidal and/or some antifungal activities. The nematode biocontrol potential of one of the most efficient isolates on the nematode were confirmed *in planta*. We used the isolate CCBLR15 to control the parasitic nematode *R. duriophilus* on *C. arabica* and the result are currently under submission for publication.

References:

- The Results presented are published in the article: Duong, B., Nguyen, H.X., Phan, H.V., Colella, S., Trinh, P.Q., Hoang, G.T., Nguyen, T.T., Marraccini, P., Lebrun, M., Duponnois, R., 2021. Identification and characterization of Vietnamese coffee bacterial endophytes displaying in vitro antifungal and nematicidal activities. Microbiological Research 242, 126613. <https://doi.org/10.1016/j.micres.2020.126613>