Social interactions between *Bacillus subtilis* and *Dickeya solani*

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Bacillus subtilis environmental isolates produce a large variety of compounds with antimicrobial activity. These bioactive metabolites have been regarded as a powerful weapon against many plant pathogens. To date, infection caused by the plant pathogen *Dickeya solani*, listed as one of the top ten bacterial pathogens of concern in agriculture, poses a significant challenge in crop management, underlined by the scarcity of effective treatments.

In this study, we investigated the environmental strain *B. subtilis* MB73/2 for its efficacy in controlling *D. solani* growth. To closely mimic the natural environment, we analysed the interaction between *B. subitlis* and *D. solani* on semi-solid agar, where bacteria can establish motility and social behaviours. Interestingly, inoculating both bacteria in the same swarming plate, the swarming of B. subtilis was interrupted at ~ 0.3 cm from the front of inoculation of *D. solani*, while the central colony of *Dickeya solani* was translocated entirely from the point of inoculation to the edge of the plate.

The presence of: (i) an inhibition zone between the interacting bacteria; (ii) a sharp front that *B. subtilis* is not capable of penetrating (iii) a coordinated and directional escaping of *D. solani*, led us to hypothesize that the observed interaction resembles a more complex antagonism than a simple avoidance mechanism.

Screening of single gene deletion mutants of *B. subtilis* and *D. solani*, led us to the conclusion that surfactin released by *B. subtilis* is required for, but not solely responsible for, *D. solani* escaping; while the Lys-R regulator in *Dickeya solani* is responsible for the inhibition zone.

Interactions between *B. subtilis* and *D. solani* described in this work are an example pf a pray-predator interaction in the context of bacterial communities. Obtained results clearly underscore the complexity of mechanisms underlying such phenomena which commonly occur in the nature.