Beneficial bacteria prime crops for enhanced resistance against human pathogens

Helena Josephina Barkowski[1], Jasper Schierstaedt[2], Abhishek Shrestha[1], Rita Grosch[2] and Adam Schikora[1]

[1] Julius Kühn-Institut, Institute for Epidemiology and Pathogen Diagnostics, Braunschweig

[2] Leibniz Institute of Vegetable and Ornamental Crops, Department Plant Health, Grossbeeren

E-mail of corresponding author: adam.schikora@julius-kuehn.de

Outbreaks of food-borne diseases, related to contaminated raw vegetables and fruits, indicate that plants are suitable hosts for human pathogens (HP). *Salmonella enterica* is able to colonize plants and use them as alternative hosts. Nonetheless, plants perceive HP and induce their defense responses. A method to increase those immune responses is priming for enhanced resistance. An efficient strategy to control plant pathogens is priming of plants with *N*-acyl-homoserine-lactones (AHL).

The aim of this study was to evaluate whether crop plants are "primable" against *Salmonella*. To this end, rhizospheres of corn salad, tomato and lettuce were inoculated with the AHL-producing strain *Ensifer meliloti* $_{expR}^{+}$, the AHL-negative *E. meliloti* $_{attM}$ strain and as positive control with beta-aminobutyric acid. Plant leaves were then sprayed or infiltrated with *salmonella*. The persistence of *Salmonella* in plants was quantified over 14 days. Furthermore, changes of transcription level of defense related genes in primed and non-primed plants were measured *via* quantitative PCR. In addition, physiological responses as the production of reactive oxygen species (ROS) and stomatal closure were assessed.

Our results revealed that *Salmonella* is able to persist in plant leaves for at least 14 days. Priming has a negative effect on the persistence of *Salmonella*. Primed plants are able to express defense related genes earlier than unprimed plants, produce a higher amount of ROS and are able to keep stomata closed. These results indicate the potential of priming for enhanced resistance against *S. enterica*.