Bacillus velezensis tolerance to the induced oxidative stress in root colonization contributed by the two-component regulatory system sensor ResE

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Abstract

Efficient root colonization of the plant growth-promoting rhizobacteria is critical for their plant-beneficial functions. However, their strategy to overcome plant immunity in root colonization is not well understood. In particular, how Bacillus strains overcome the plant-derived ROS, which functions as the first barrier of plant defense, is not clear. In the present study, we found that the homologue of flg22 in B. velezensis SQR9 (flg22SQR9) has 78.95% identity to the typical flg22 (flg22P.s.) and could induce significant oxidative burst in cucumber and Arabidopsis. In contrast to pathogenic or beneficial Pseudomonas, living B. velezensis SQR9 induced an oxidative burst in plant. We further found that B. velezensis SQR9 could tolerate higher H2O2 than Pseudomonas syringae pv. tomato (Pst) DC3000, the pathogen that harbored the typical flg22, and possesses the ability to suppress the flg22-induced oxidative burst, indicating that B. velezensis SQR9 may exploit a more efficient ROS tolerance system than DC3000. Further experimentation with mutagenesis of bacteria and Arabidopsis showed that the two-component regulatory system sensor ResE in B. velezensis SQR9 was involved in tolerance of plant-derived oxidative stress, thus contributing to root colonization. This study supports the further investigation of interaction between beneficial rhizobacteria and plant immunity.

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