Isolation and Characterization of Rhizobacteria Involved in Enhancement of Salt Tolerance of Halophytes

Takashi Ozawa[1] and Shuhei Fujii[2]

[1]Graduate School of Agriculture and Biological Sciences, Osaka Prefecture University

[2]Tezukayama College

Summary

A diverse population of microbes lives in a rhizosphere of plant where a various signal substances are transferred between the organisms. Consequential results of the mutual interaction, such as symbiosis and parasitism, significantly affect the plant growth. Halophytes growing in salt marshes also offer good residence in the rhizosphere for microbes to proliferate, and may be influenced by these microbes. We examined in this study the possibility of enhancing salt tolerance of saltwort (*Salicornia europaea*) by nitrogen-fixing rhizobacteria.

Seven, 4, and 1 strains of nitrogen-fixing rhizobacteria were isolated from the roots of saltwort, aster (*Aster tripolum*), and reed (*Phragmites australis*), respectively. These plants grew wild in a previous salt field at Okayama Prefecture, Japan. The homogenate of the excised root was inoculated to a soft agar medium containing 0.5 % malic acid, 0.002 % yeast extract, and 5 % NaCl. From among the bacteria grown in the medium, aerobic nitrogen-fixing bacteria were isolated on LB agar plates. The isolates were classified by physiological characteristics and 16S rRNA gene sequences. One of the isolates from saltwort, *Pseudomonas pseudoalcaligenes* strain Sal35, was inoculated to saltwort seedlings on a nutrient agar medium. The inoculation suppressed the decrease of chlorophyll content of the plants grown on the medium supplemented with 0.9 M NaCl. The inoculated plants had a larger amount of glycine betaine than un-inoculated plants. The results in this study suggest that strain Sal35 isolated from the rhizosphere of saltwort may enhance the salt tolerance of the plant by affecting the biosynthetic process of glycine betaine as a compatible solute.