Salt balance in the mangrove *Rhizophera stylosa* Griff. with reference to water balance

Tadashi Hirasawa[1], Kuni Ishihara[2] and Taiichiro Ookawa[1]
[1]Faculty of Agriculture, Tokyo University of Agriculture and Technology, [2]Faculty of International Agriculture and Food Studies, Tokyo University of Agriculture

Summary

For conserving and recovering mangrove vegetations, it would be required to characterize environmental conditions where the mangrove plants can establish and grow and their adaptable responses to the conditions. In the present research, we investigated salt balance in the mangrove plants, *Rhizophera stylosa* Griff. growing in the culture solution with NaCl of different concentrations as well as their water balance since water uptake and transpiration should affect salt balance significantly. We also tried to characterize NaCl transport properties of the mangrove roots with a root pressure probe.

The 1.3 year-old seedlings grown in the culture solution with 50mM NaCl were transplanted to the solution with 0, 50, 200 and 500mM NaCl and grown in the temperature-controlled chamber (day(12h);30℃, night(12h);23℃) for about 2 months. The plants in the solution with 200mM NaCl were the largest in the total water uptake, and the plants in the solution with 500mM NaCl, the smallest. Changes of plant water content were about 1% of the total water uptake during the treatment. Therefore, most of water which was absorbed during the treatment was to be transpired. The ratio of the total amount of absorbed water to water content of an individual plant was 9-11, 12, 12-19 and 6-7 for the plants in the solution with 0, 50, 200 and 500mM NaCl, respectively. Even though such large amount of water was absorbed and transpired, the ratio of Na^+ content to the total amount of water in a plant, that is, Na^+ concentration did not change significantly for the plants in the solution with 0mM NaCl. The Na^+ concentration in a plant increased significantly in the solution with 200 and 500mM NaCl, but the increase was larger in the plants in the solution with 500mM NaCl than the plants in the solution with 200mM NaCl. The increase in the Na^+ concentration of the culture solution with a plant was significant compared with the solution without a plant. The value of the increase of Na^+ content divided by the total amount of absorbed water was only 3-4%, 6-8% of the concentration of the culture solution for the plants in the solution with 200, 500mM NaCl, respectively. These results suggest that tissue Na^+ concentration was regulated in *Rhizophera stylosa* although it was not known whether Na^+ was not transported into roots together with transpiration stream or Na^+ went back to the solution after it was transported into plants.

The mean reflection coefficient of roots for NaCl was only 0.08. This was small compared with other plants. The mean permeability coefficient of roots for NaCl was smaller than 1.6×10^{-9} ms^{-1}. The mechanisms of the regulation of the salt balance were discussed in view of the root properties in NaCl transport.