

Study on the Salinity Tolerance of Mangroves

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Summary

This survey was conducted in Iriomote Island, Okinawa Prefecture to collect basic data of the salinity tolerance mechanism of mangrove plants. We tried to explain such mechanism from a standpoint of the oxygen supply system from the pneumatophores to the roots through the aerenchyma passages.

Two groups of mangrove species were investigated. One group, which contains Sonneratia alba and Avicennia marina, has a higher salinity tolerance in comparison to the other group, which contains Rhizophora stylosa and Bruguiera gymnorhiza. In addition, the pneumatophores of S. alba and A. marina have chloroplasts in their surface layers and oxygen produced in photosynthetic reaction is transported to the roots in the subsoil. R. stylosa is similar to these 2 species but the photosynthetic activity is very low. B. gymnorhiza has no chloroplasts in the pneumatophores and there is no photosynthetic reaction. In order to investigate that this difference in the oxygen supply systems of the pneumatophores between these two groups of mangrove species is closely related to the difference of the salinity tolerance, the change of oxygen concentration in the pneumatophores which accompanied the changes of the tidal level and the solar radiation was measured.

As a result, the oxygen concentration in the pneumatophores of these 4 mangrove species decreased when the pneumatophores were submerged. The oxygen concentration of the submerged pneumatophores of S. alba and A. marina were higher than those of R. stylosa and B. gymnorhiza under the higher solar radiation because of the photosynthetic reaction. Hence A. marina and S. alba could transport oxygen to the roots during day time even at high tide. This fact shows that a high activity of root respiration is maintained during day time regardless of the tidal level and that it may contribute to the salinity tolerance of the roots in the salty and muddy soil.