Applied Engineering Research on Improvement of Ecological Environments in Sea Coast

HIROO INOUE

Faculty of Agriculture, Kagawa University

This paper is a record of studies on developing the method of monitoring the sea water quality by UV-visible spectrum analysis and on analyzing the process of extracting salt from the agricultural soils to improve them.

(1) Optical Properties and Dynamic Decomposition Processes of Dissolved Organic Matter in Coastal Sea Water (HIROO INOUE and TADASHI OCHI)

The water sample filtered throughout 0.45μ Millipore filter to which was added only a drop of raw sea water was placed in a 10 L glass bottle and incubated in the dark. After selected time intervals, the materials were analyzed for the dissolved organic carbon and nitrogen and absorbance.

A little apparent change in the absorption coefficient at 340 nm was observed and 30-40 % of the initial DOC was utilized within the first 30-40 days. However, there were no significant changes throughout the rest of experiment. It seemed that, after the 50-80 days of incubation, the DOC was comprised largely of refractory organic carbon compounds that were relatively resistant to bacterial decomposition. At this time, a*340 measurements on a series of water samples yielded a straight line when plotted against the concentration of DOC* or DON*. Average values of DOC*/DON* and (a*280 − a_w280)/a*340 were estimated and compared with those observed under natural conditions.

(2) Environmental Control in Sea Coast (HAJIME NARIOKA)

Fundamental studies on salinization mechanism in soils, transformation of soil structure, formation of soil crust and transplantation of a halophyte were carried out. We paid attention to the fact that the halophyte from sea coast could flourish in a barren brackish area. By accumulated salts, the soil structure was made fine and its peameability was fallen, while Excoecaria aggallocha growing in sea coast survived after one year. The soil crust formed had an isolated porous structure. There was some negative correlation between EC and permeability of saturated soil. A positive correlation was found between diameter of plant trunk and bulk density of soil.

(3) Methods of Desalinization and Improvement of Na-type Soil in Kasaoka Bay Polder (KINZO NAGAHORI)

Desalinization was successful at the beginning of drainage and the field was improved physically. Several years after drainage, however, physical properties of soil were coming down with decreasing salt content and eventually crop productivity has been lowering. It is because the polder soil is composed of Na-type clay. It was made clear that the physical improvement and the desalination could be facilitated effectively by changing the soil from Na-type clay to Ca-type clay. 1) A depth of the root zone was improved by mixing the plaster, as judged from ESP and EC curves. 2) A basal calculation method of plaster requirement was found according to the situation of soil. 3) Effectiveness of the plaster added was evaluated by measuring dispersion, sedimentation and volume. Moreover, in this paper the effects of plasters on desalinization were tested in the field irrigated by water spraying.