A FIELD OBSERVATION ON THE ECOSYSTEM AND WATER QUALITY AND THEIR SEASONAL VARIATIONS IN AN IRRIGATION POND WITH A FLOATING-LEAVED PLANT (*NYMPHOIDES INDICA*) COMMUNITY

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A lot of studies concerning macrophytes have been carried out and the observations and measurements on absorption of nutrients by macrophytes have been accumulated. However, other effects of macrophytes, such as sheltering of sunlight and recycle of nutrients due to withering have been treated only in a few researches.In addition, the greater part of the previous studies has dealt with emerged plants and submerged plants, so a few papers have treated floating-leaved plants.

In this study, a field observation was carried out in an irrigation pond with a floating-leaved plant (*Nymphoides indica*) community every week through a year (2003). The aim of this study is to make clear the contributions of a floating-leaved plant community to the ecosystem and water quality in on irrigation pond.

In the field observation, we monitored the appearance of the floating-leaved plant community and the values of a variety of water quality items. The values of the water quality items were measured at the levels of 20(%) depth and 80(%) depth both at Station A (the inside of the plant community) and at Station B (the outside of the plant community).

The floating-leaved plant community greatly makes positive contributions in summer. In June and July, the values of S_{DO} (the degree of saturation in DO) increase according to great multiplication of phytoplankton in the surface layer at the both stations (see Figs.1 and 2 ; in these figures, for example, 'A-0.2' expresses a point of 20(%) depth at St.A). However, the values of Chl.-a at A-0.2 are smaller than those at B-0.2. This is because the floating-leaves shelter sunlight and the roots absorb nutrients in the plant community.

S_{DO} largely drops at B-0.8 in June and July, especially in July, oxygen-deficient water masses appear in the bottom layer at St. B (see Fig.1). The mechanism concerning this phenomenon is as follows. DO is consumed in the bottom layer, when the detritus originating in the phytoplankton falling down from the surface layer are decomposed by

bacteria. However, DO is not supplied from the surface layer to the bottom layer due to existence of density stratification. On the other hand, S_{DO} does not take extremely low values at A-0.8 in June and July as shown in Fig.1. This reason is that the floating-leaved plant community suppressed multiplication of phytoplankton in the surface layer. Accordingly, it was shown that the plant community has a great effect on prevention of the oxygen-deficient phenomenon in the bottom layer in summer.

The floating-leaved plant community slightly gives negative influence in fall and winter. In October and November, the values of Chl.-a at A-0.2 are greater than those at B-0.2 (see Fig.2). This phenomenon is noteworthy and is associated with withering of the plant community. Phytoplankton multiplies at A-0.2 according to recycle of the nutrients from the plant body into the water body as well as an increase in intensity of sunlight in the surface layer due to disappearance of the floating-leaves.

However, S_{DO} rises up at A-0.8 in October and November (see Fig.1), then, the influence of decomposition of the detritus originating in the floating-leaved plant cannot be recognized. This result is thought to be connected with the following two points. One is active transport of DO from the surface layer to the bottom layer in the absence of density stratification. The other is a drop in the water temperature, and then, decomposition of the detritus would be largely suppressed.

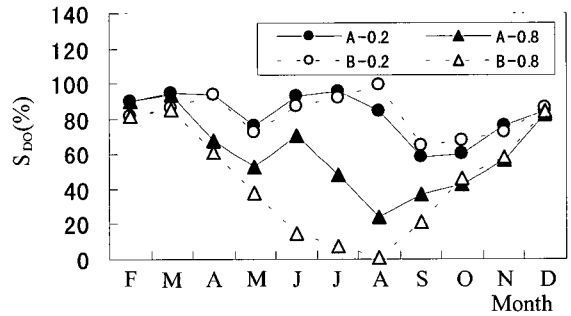

Fig.1 Monthly variations of S_{DO} (the degree of saturation in DO (dissolved oxygen))

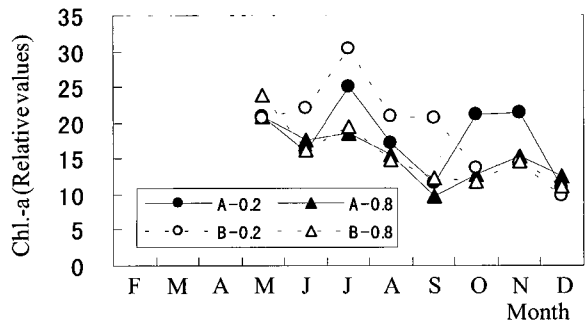

Fig.2 Monthly variations of Chlorophyll-a (relative values)