A Study on Phytoplankton Communities in the Reservoir of Nakdong River Estuary

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ABSTRACT

Species composition and standing crop of phytoplankton assemblages were studied in the reservoir of Nakdong River estuary from June 1988 to April 1989 at bimonthly intervals. In the course of this study, 197 taxa of phytoplankton were identified. As a result of dam construction no marine phytoplankter was collected in this study. The common species in this reservoir were Cyclotella comta, C. meneghiniana, Melosira granulata var. angustissima, Synedra acus, S. ulna and Nitzschia palea. The richest phylum in numbers of taxa was Chlorophyta, followed by Chrysophyta and Cyanophyta. Maximum standing crop was observed in August, and minimum in December. Spatial variation of standing crop was insignificant.

Key words: Phytoplankton, Standing crop, Estuary

INTRODUCTION

Nakdong River which is originated from the Taebaek Mountains is one of the most important river and the only source of water supply in the southeastern part of Korean peninsula. At the mouth of this river, vast estuary was developed by continuous river activity. The estuarine system of Nakdong River was a good habitat for a variety of organisms including algae, macrophytes, invertebrates, fish, and birds. However, after the construction of estuarine dam (in 1987) several features of habitat have been changed. Therefore, it is appropriate that serious attempts be made to document the effects of such changes.

There are several studies on phytoplankton (Chung et al., 1987; Moon et al., 1988) and physico-chemical characteristics (Won and Yang, 1978; Lee and Won, 1980; Won and Lee, 1981; Park et al., 1985) before the construction of estuarine dam. After dam construction, however, few data are available.

The purpose of this study is to present the composition and standing crop of phytoplank-
kton assemblages in Nakdong River estuary after dam construction.

DESCRIPTION OF STUDY AREA

For this study, samples were collected from 5 stations in Nakdong River estuarine reservoir bi-monthly from June 1988 to April 1989.

Sampling stations are illustrated in Fig. 1 (St. 1; Daedong, St. 2; Gupo, St. 3; Nakdong Bridge, St. 4; Myungji, St. 5; Hadan). Stations 1, 2 and 3 were located in 15 Km, 12 Km and 6 Km upper part of estuarine dam, and station 4 and 5 were west and east side of estuarine dam, respectively.

Fig. 1. A map showing the sampling stations.

METHODS

Samples were collected at 0.5 m depth of each station using Van Dorn water sampler.

Water temperature and pH were measured with portable pH meter (Hanna, HI8314). DO (dissolved oxygen) and BOD (biochemical oxygen demand) were determined by Winkler method (Wetzel and Likens, 1979), and COD (chemical oxygen demand) with KMnO₄ as oxidizing agent (APHA, 1985). NO₃-N (nitrate nitrogen) and NH₄-N (ammonium nitrogen) were measured by spectrophotometric method (APHA, 1985).

Phytoplankton samples (1,000 ml), preserved with acidic Lugol's iodine solution, were settled in conical settling tubes for 24 hr and concentrated to 20 ml. 0.1 ml of concentrated samples were taken by syringe and poured on slide glass, and examined with Nikon SE microscope at ×400, ×800 and ×1,000. Phytoplankton enumeration was performed using Sedgwick-Rafter counting chamber and settling chamber (Wetzel and Likens, 1979). Fields count was made until at least 100 cells of each of the dominant phytoplankton species were counted (Siegfried et al., 1989).

RESULTS AND DISCUSSION

1. Physico-chemical analysis

Seasonal changes in water temperature, pH, DO, BOD, COD, NO₃-N, and NH₄-N are given in Table 1. As Nakdong River estuary is located in southern part of temperate region, water temperature never dropped below 4°C throughout the year. The ranges of pH were similar in all stations. The average concentrations of DO, BOD, and COD were 8.00 mg/l, 3.22 mg/l and 7.38 mg/l, respectively. These value come under oligosaprobity of water pollution level (Sládecek, 1968). The concentration range of NH₄-N (0.08~0.4 mg/l) came under the level of β-to α-mesosaprobity. However, the range of NO₃-N concentration (1.19~2.26 mg/l) exceeded the level of polysaprobity (Sládecek,