

# Seasonal Occurrence of Plankters in Irrigation Ponds in Awaji Island, Japan

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Plankton species occurring in artificial irrigation ponds in Awaji Island, Hyogo Prefecture, are those commonly distributed in eutrophic inland water in the temperate latitudes (Tomikawa 1966, 1967a, 1967b). The writer studied seasonal variation of occurrence of each plankter at four ponds based on the monthly collections covering three years from November 1963 to October 1966 (Fig. 1).

Temperature of water varied seasonally from 4.5 °C (at Nakayama-ike, February 1964) to 33.6°C (at Taro-ike, August 1964). Hydrogen concentration of the water in the four ponds was generally kept at pH 7.0-7.6. The water of Taro-ike contained considerable humus, and the minimum pH value as low as 6.0 was observed in April 1965. The maximum pH value at Nakayama-ike reached 8.8 in July 1965, when phytoplankton

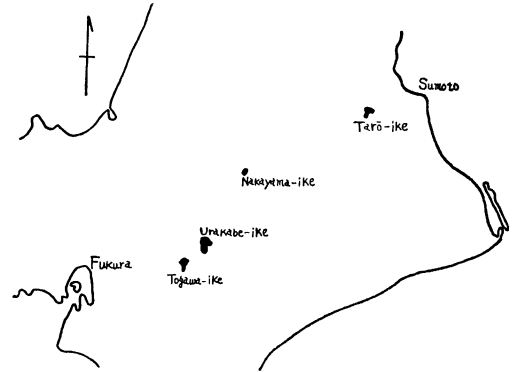


Fig.1. Map showing location of four pond group, Mihara-gun, Hyogo Prefecture.

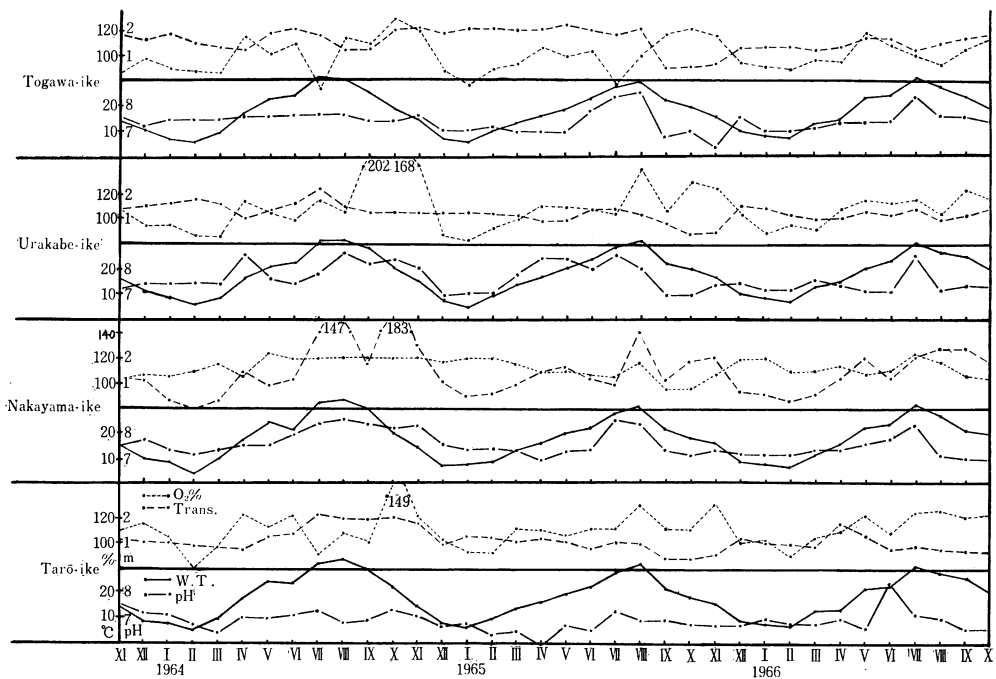


Fig.2. Seasonal fluctuation of the hydrographic conditions in four ponds.

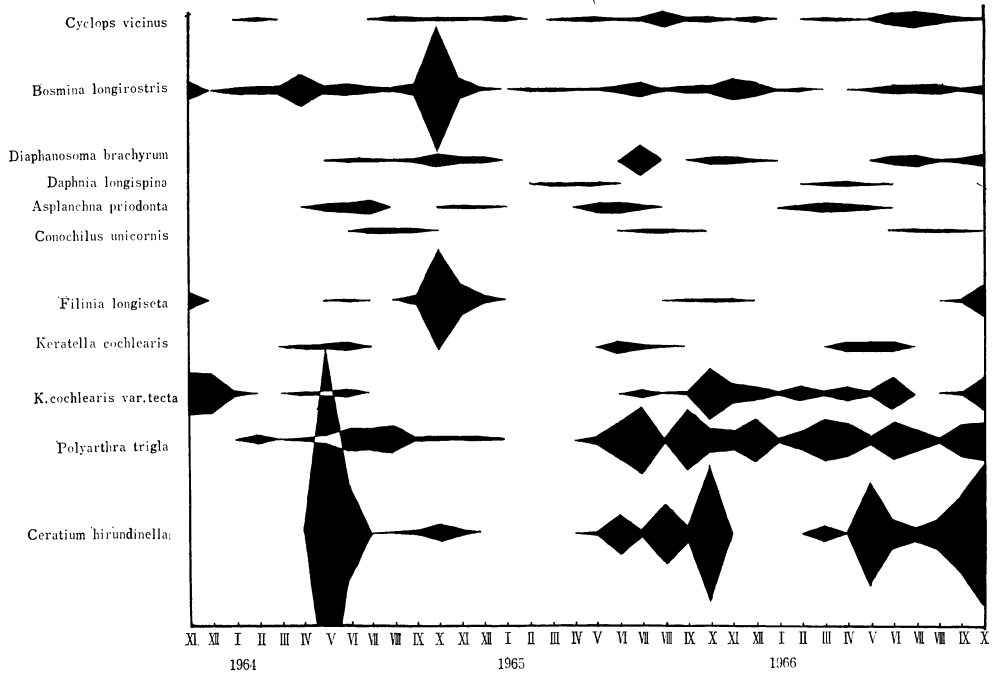


Fig. 3. Seasonal fluctuation of dominant species of plankton in Togawa-ike.

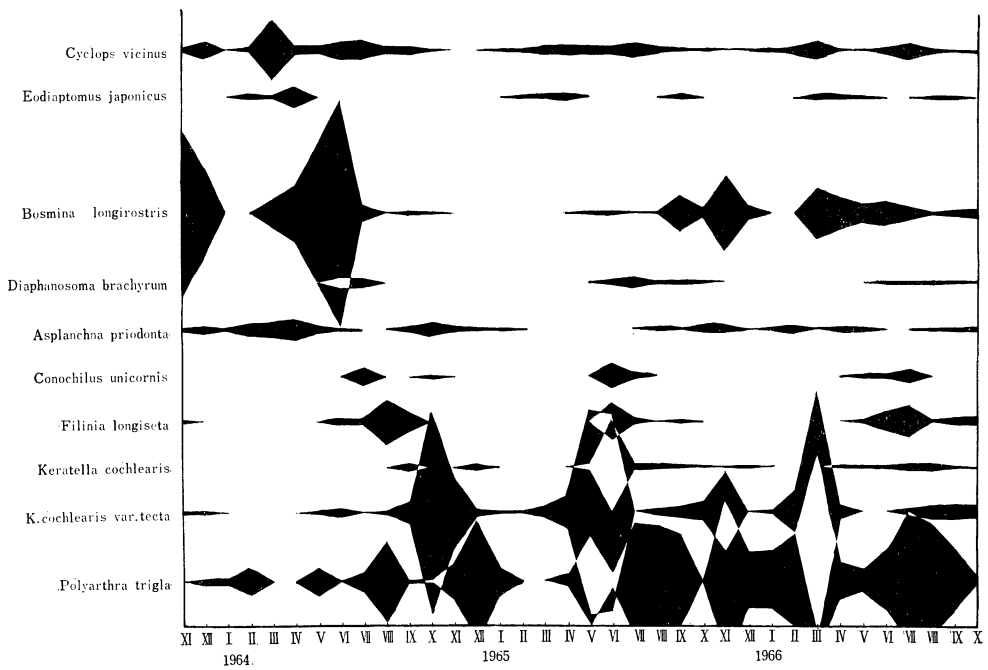


Fig. 4. Seasonal fluctuation of dominant species of plankton in Urakabe-ike.

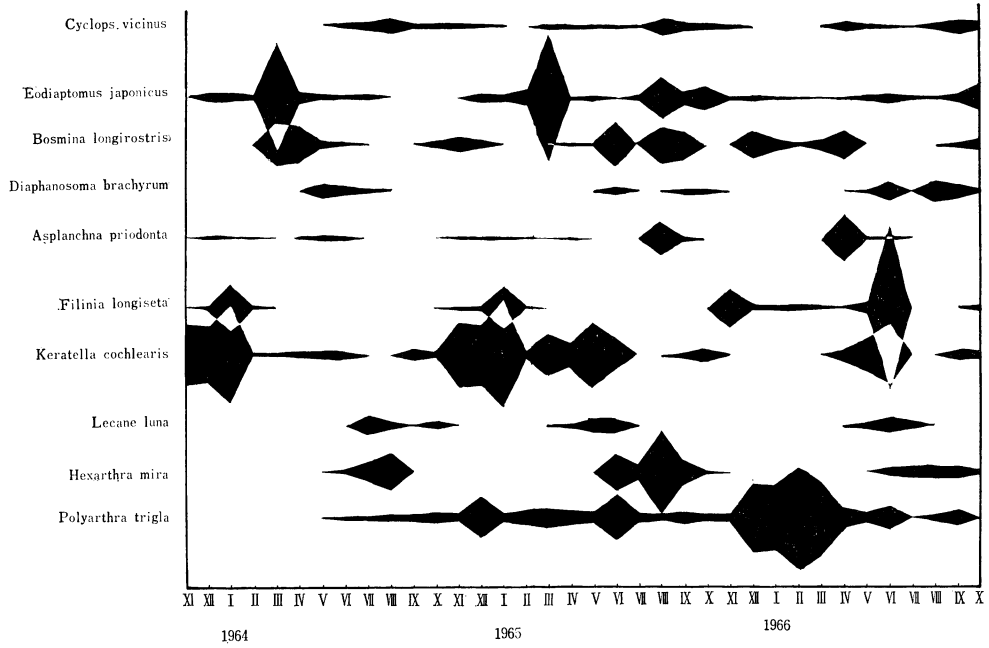


Fig. 5. Seasonal fluctuation of dominant species of plankton in Nakayama-ike

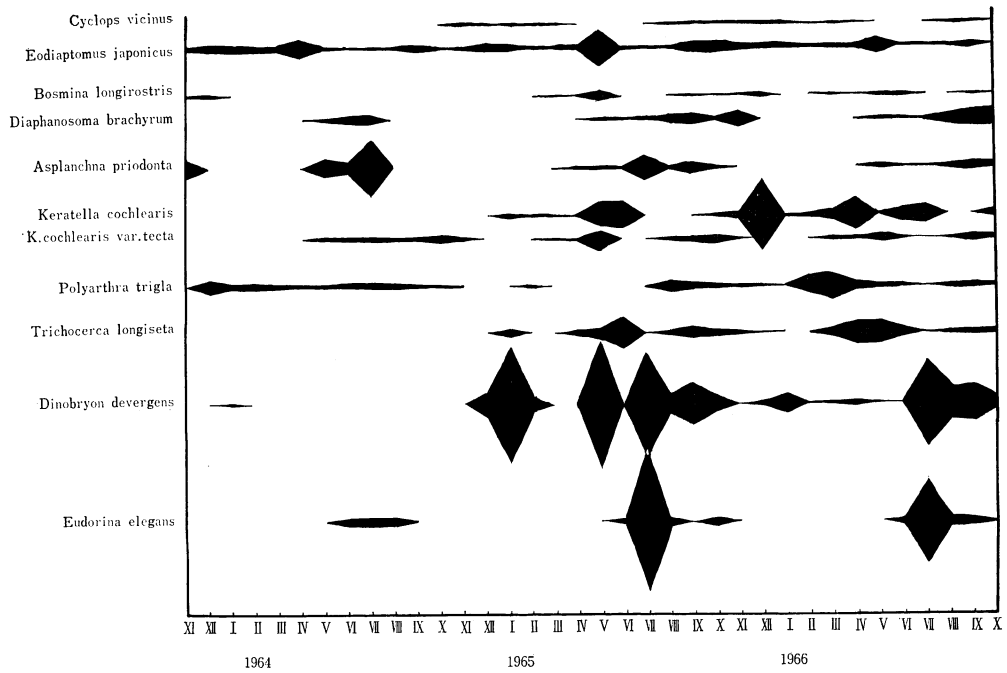


Fig. 6. Seasonal fluctuation of dominant species of plankton in Taro-ike

growth was remarkable. The water of the four ponds was very turbid, the maximum transparency (Secchi disc reading) being 2.2 meters, with the minimum transparency of 0.4 meters throughout all seasons in the four ponds. Content of dissolved oxygen in somewhat dystrophic Taro-ike measured 70.4% saturation in February 1964. But in other ponds the dissolved was oversaturated at the time of phytoplankton growth.

The maximum content was 202.6% at Urakabe-ike in September 1964 (Fig.2).

Plankton was collected by surface tow with a Motoda's quantitative plankton net at the intervals of monthly in the four ponds throughout three years. 54 species of plankters were identified, and the number of each plankter was counted (Fig. 3-6).

Among zooplankters rotifers were dominantly present every time. The maximum occurrence of phytoplankton was observed in autumn and the minimum was in winter.

According to the fluctuations of numbers of plankters the seasonal curve of leading species can be classified into unimodal type and polymodal types as follows:

Unimodal type:

*Daphnia longispina*, *Brachionus angularis*, *B. angularis* var. *bidens*, *B. angularis* var. *cheloris*, *B. calyciflorus*, *B. forficula*, *B. falcatus*, *Keratella quadrata*, *K. quadrata quadrata*, *K. quadrata irregularis*, *K. quadrata testudo*, *K. quadrata divergens*, *K. valga tropica*, *K. valga asymmetrica*, *K. valga monstrosa*, *Lecane flexilis*, *L. luna*, *Notholca labis*, *Monostyla bulla*, *M. sinuata*, *Synchaeta oblonga*, *Trichocerca bicristata*, *T. elongata*, *T. tigris*, *Eudorina elegans*, *Euglena acus*, *Heleopera petricora*.

Bimodal type:

*Eudiaptomus japonicus*, *Alona guttata*, *Bosmina longirostris*, *Bosminopsis deitersi*, *Daphnia pulex*, *Diaphanosoma brachyrum*, *Brachionus rubens*, *B. calyciflorus* var. *amphiceros*, *B. urceolaris*, *Monostyla hamata*.

Polymodal type:

*Cyclops vicinus*, *Asplanchna priodonta*, *Conochilus unicornis*, *Filinia longiseta*, *Hexarthra mira*, *Keratella cochlearis*, *K. cochlearis* var. *tecta*, *K. valga*, *Polyarthra tri-gla*, *Ploesoma truncatum*, *Pompholyx complanata*, *Trichocerca longiseta*, *T. stylata*, *Diffulgia corona*, *Dinobryon divergens*, *Ceratium hirundinella*, *Volvox aureus*.

## Discussion

As the results of this study, three types of annual periodicity can be distinguished in occurring patterns of plankton in the ponds, i. e. unimodal, bimodal and polymodal types.

As for plankton in reservoirs, Mizuno (1961) has made detailed studies on periodical changes of them at an irrigation pond in Ikeda City and Shimo-ike pond in Itami City.

The results dealt with in the present paper show a good accordance in tendency with investigation by Mizuno (1961) mentioned above. However, because of the great changes of surrounding conditions, the periodicity of plankton appearance in reservoirs is comparatively different from that observed in natural inland waters.

As a general inclination, species which belong to bimodal and polymodal types on their periodical appearance are eurythermal, and species of the unimodal type are stenothermal. Eurythermal plankters are usually abundant in individual number than stenothermal species. Among zooplankters, rotifers are dominantly present every month in the irrigation ponds similarly to most reservoirs in Japan. Phytoplankton show a tendency to increase the individual number in autumn, but are minimal in winter. A rare number of zooplankton species common in tropical water are found in summer, and also a small number of boreal zooplankters appear in winter.

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## Literature Consulted

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