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# SEASONAL STUDIES ON FRESHWATER CLADOCERA OF CHINGLEPUT TANK, TAMILNADU

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## INTRODUCTION

Very little is known regarding the distribution of different species of Cladocera in Tamil Nadu. Earlier Sumithra Vijayaragavan (1970) studied on a natural population of *Daphnia carinata* King. Michael (1973) reported about Cladocera of Madurai area. Further Navaneethakrishnan and Michael (1971), Murugan and Sivaramkrishnan (1973,1976), Murugan (1975a,b,1977), Murugan and Venkataraman (1977) and Venkataraman and Job (1980) worked out the biology of certain cladocerans from Madurai. Polymorphism and predation of *Daphnia carinata* were dealt by JohnoBrien and Vinyard (1978). Murugan (1981) made observations on the natural history of cladocerans from a small pond in Madurai. Further studies on planktonic cladocerans were made by Raghunathan (1983,1985a,b,c,1986). Recently Venkataraman and Krishnaswamy recorded (1984a,b) two new records from TamilNadu. Further laboratory culture studies on *Diaphanosoma senegal* Gauthier were made by Venkataraman and Krishnaswamy (1985). Regarding cyclomorphosis further studies were made by Venkataraman and Krishnaswamy (1986) and Manimegalai *et.al* (1986). There appears to be a paucity on studies of the natural populations of Cladocera. Hence a long term study on the Cladocera of Tamilnadu was undertaken and here the study pertaining to Chingleput tank is discussed.

## CHINGLEPUT TANK

Chingleput tank is 3.3 km. long and 1.6 km. wide and situated in Chingleput town, 58 km south of Madras. The average depth was 1.5 m. The tank has well developed boat club and regular fishing activities are undertaken. The following fishes were noted in the collections namely *Puntius dorsalis, Puntius sarana, Puntius parrah, Channa punctatus, Etroplus maculatus, Etroplus suratensis, Danio equipinnatus* and *Rasbora daniconius* indicating the availablity of more number of plankton feeding species. It is a perennial tank irrigating about 2000 ha. in fifteen villages and rain water is the major source of the tank.

## MATERIAL AND METHODS

A 0.25 m(diameter) nylon net (0.3mm. mesh size) was operated (Length 1.0 m.) so that the attached rope (2.55m.) was in the water and in this manner plankton samples

were collected from a wooden boat. From April 1979 to June 1980 regular samples were collected. The samples were preserved in 5% formalin and made up to 250 ml. From this subsample of 2ml. was examined in a Sedgewick-rafter cell for counting purposes. Total number of specimens collected are given for 500 litres of water filtered assuming the filtration efficiency of the net is 100% (Rawson, 1956). Cladocerans were separated individually and indentified.

Surface water samples collected from two stations along with the plankton were analysed for dissolved oxygen (Winkler's method with azide modification) and pH. Other paramcters like depth, transparency, air temperature and water temperature were also recorded.

## RESULTS
(Table 1 & 2)

From the results of two stations, the average was taken for each month. The air temperature fluctuated from a minimum of 26.5°C to a maximum of 32.5°C. The water temperature fluctuated between 26.5°C and 32.0°C. The maximum water temperature was recorded during April and May and the minimum in December.

TABLE 1

**Physico-Chemical Parameters of Chingleput Tank**

| Month | Air Temp. C | Water C | Depth M | Transp. M | pH. | D.O. mg/1. |
|---|---|---|---|---|---|---|
| April 1979 | 32.5 | 32.0 | 1.50 | 0.75 | 7.10 | 1.20 |
| May 1979 | 32.0 | 32.0 | 1.30 | 0.60 | 7.30 | 1.40 |
| June 1979 | 29.0 | 28.0 | 1.40 | 0.60 | 7.65 | 0.90 |
| July 1979 | 29.0 | 29.0 | 2.00 | 0.60 | 7.80 | 1.50 |
| Aug. 1979 | 32.0 | 30.5 | 2.20 | 0.30 | 8.50 | 4.10 |
| Sept. 1979 | 30.0 | 29.0 | 2.25 | 0.30 | 8.4 | 4.0 |
| Oct. 1979 | 29.5 | 30.0 | 2.00 | 0.30 | 8.50 | 7.14 |
| Nov. 1979 | 28.0 | 27.5 | 2.00 | 0.60 | 7.5 | 7.0 |
| Dec. 1979 | 27.0 | 26.5 | 2.10 | 0.80 | 8.5 | 8.0 |
| Jan. 1980 | 27.0 | 27.0 | 2.0 | 0.60 | 8.50 | 8.0 |
| Feb. 1980 | 27.0 | 28.0 | 1.25 | 0.45 | 8.25 | 8.1 |
| March 1980 | 29.0 | 29.5 | 1.30 | 0.50 | 8.2 | 8.4 |
| April 1980 | 30.0 | 32.0 | 1.20 | 0.45 | 8.10 | 7.70 |
| May 1980 | 32.0 | 32.o | 1.10 | 0.30 | 8.00 | 15.60 |
| June 1980 | 29.5 | 28.5 | 1.0 | 0.35 | 7.90 | 9.90 |

TABLE 2

**Chingleput Tank - Plankton**

| Month | C. cornuta | M. micrura | D. excisum | Chy reti culatus | A. guttata | D.lum holtzi | Cal. cope pods | Cycl. cope pods | Cop. epo dite | Brac hio nus | Testu dinella |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr. 1979 | 875 | — | — | — | — | — | 625 | 3500 | — | — | — |
| May 1979 | 500 | 250 | 375 | — | — | — | 625 | 2875 | 90000 | — | — |
| Jun. 1979 | 7625 | 2750 | 9500 | — | — | — | 1250 | 6625 | 875 | — | — |
| Jul. 1979 | 2750 | 1500 | 1125 | — | — | — | 750 | 3000 | 1750 | — | — |
| Aug. 1979 | 4750 | 1625 | 2250 | 875 | 375 | — | 2625 | 3375 | 6125 | — | — |
| Sep. 1979 | 41750 | 5250 | 1875 | 22125 | 125 | — | 1125 | 3625 | 7125 | 1000 | 875 |
| Oct. 1979 | 42750 | 5625 | 2125 | — | — | — | 1125 | 2125 | 1375 | 2875 | 3375 |
| Nov. 1979 | 4750 | 3625 | 1125 | 1875 | — | — | 2750 | 750 | 3625 | — | — |
| Dec. 1979 | 1750 | 125 | — | 1000 | 125 | — | 500 | 375 | 625 | — | — |
| Jan. 1980 | 6125 | 625 | 2000 | — | 375 | 125 | 250 | 1375 | 2375 | — | — |
| Feb. 1980 | 14125 | 125 | 4000 | 125 | — | 375 | 6500 | — | 3250 | — | — |
| Mar. 1980 | 3125 | — | 2000 | 1000 | — | — | 3500 | 14750 | 16125 | — | 250 |
| Apr. 1980 | 875 | 500 | 22625 | — | — | — | 1375 | 5875 | 7750 | — | — |
| May 1980 | 375 | — | 5250 | — | — | — | 39875 | 6000 | 6750 | — | — |
| Jun. 1980 | — | — | 875 | 48125 | — | — | 4250 | 6125 | — | — | — |

The maximum depth recorded was 2.25 m. during September 1979 and the minimum depth was 1.0 m. in June 1980. The transparency values ranged between 0.30 m. And 0.80. with maximum in December 1979 and minimum in August, September, October 1979 and May 1980.

The variation in pH accounted to 1.4 units between the highest value of 8.5 and the lowest value of 7.1. Higher values were recorded during August, October, December 1979 and January 1980. Dissolved oxygen content varied from a minimum of 0.9 mg/1. to a maximum of 15.6 mg/1. The maximum value (185%) was recorded in May 1980, perhaps because of good sunshine and more amount of primary production. Except between April and July 1979, the dissolved oxygen values were above 4 mg/1.

From the view point of the volume of plankton, the maximum of 10 ml. was noted in June 1979 and the minimum of 1.5 ml. in January 1980.

The species of Cladocerans encountered in the samples were *Ceriodaphnia cornuta* Sars; *Diaphanosoma excisum* Sars; *Moina micrura* Kurz; *Chydorus reticulatus* Daday; *Daphnia lumholtzi* Kurz and *Alona guttata* Sars.

*Ceriodaphina cornuta* was represented in almost all the samples except in June 1980, with maximum during October 1979 (42750) and more numbers in September 1979 (41750) and February 1980 (14125). *Diaphanosoma excisum* was noted in most of the samples except during April and Decempber 1979 with maximum in April 1980 (22625). On the other hand *Moina micrura* was represented from May 1979 to February 1980 with maximum in October 1979. Like *Ceriodaphinia cornuta. Chydorus resticulatus* was recorded from August 1979 with maximum during June 1980. *Daphnia lumholtzi* and *Alona guttata* were recorded only in very few numbers.

Among the other constituents, calanoid copepods were present in almost all samples with maximum during May 1980. Cyclopoid copepods were also present in the samples with maximum in March 1980. Rotifers namely *Brachionus* sp. and *Testudinella* sp. were present in September and October 1979.

## DISCUSSION

During the present study the most dominant species were *Ceriodaphnia cornuta, Diaphanosoma excisum and Moina micrura. Ceriodaphnia cornuta* occurs in most of the freshwaters near Madras (Raghunathan, 1983). A major peak was noted in September and October 1979 and a minor peak in February 1980. During these periods increase in plankton volume was mainly due to the abundance of this species. During September, October 1979 and February 1980, the dissolved oxygen values were from 4.0 mg/1 to 8.1 mg/1. (52%to 102%) and the pH was on the alkaline side with 8.25 to 8.50. Michael (1962) has recorded *C. cornuta* from a pond during certain periods of the year with a rapid increase from January to March resulting in swarming conditions which was attributed to the abundance of flagellates and ciliates.

*Moina micrura* was also recorded in greater numbers during the same months namely September and October 1979. Parabrahmam et al (1967) have observed that an optimal pH of 7.5 to 8.2 and a temperature of 28°C to 31°C were suitable for the growth of *Moina micrura*. During the present investigation it was seen that the same temperature range accompanied by a pH range of 8.4 to 8.5 and dissolved oxygen values from 4.0 to 7.14 mg/1. were equally suitable for this species. Krishnamuthy (1967) however observed that dissolved oxygen values so low as 0 to 2.0 mg/1 were more suitable for the increase of *Moina* sp.

For *Diaphanosoma excisum* only one major peak was seen during April 1980. The dissolved oxygen values were higher namely 7.7 mg/1. (105%) with pH 8.1 during the peak period. A fair abundance of *Chydorus reticulatus* was noted in September 1979 with maximum in June 1980. During these months the dissolved oxygen values were between 4.0 to9.9 mg/1. and the pH from 7.9 to 8.4. The other forms namely *Daphnia lumholtzi* and *Alona guttata* were noted only in very few numbers and no comparable conclusions could be drawn. But *D. lumholtzi* is a rare species in the lower altitudes in Tamilnadu while it is not so rare in higher altitudes (Raghunathan, 1983). Here in Chingleput tank, out of thirty periodical collections only four samples contained *D. lumholtzi* and that too in fewer numbers.

## SUMMARY

Studies on Cladocera of Chingleput tank were undertaken from April 1979 to June 1980. Six species of Cladocera namely *Ceriodaphnia cornuta* Sars; *Diaphanosoma excisum* Sars; *Moina micrura* Kurz; *Chydorus reticulatus* Daday; *Daphnia lumholtzi* Kurz and *Alona guttata* Sars, were encountered in the samples. The seasonal periodicity of cladocerans is correlated with ecological parameters namely temperature, pH, dissolved oxygen, depth and transparency.

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