Population Biology of Lymnaea Truncatula in Irrigation Canals in Tholoeiya Village

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Summary

A population of Lymnea truncatula was sampled at Tholoeiya on monthly intrval from March 1985 to June 1986 from irrigation canals to estimate density, population size structure, cohort composition. Population density, varied monthly with two peaks, a major peak in May and a minor one in November. Snail bred twice in a year and the population was made up of two generations. A high density cohorts extending over winter, and a low density cohort over summer.

Introduction

This study deals with a single species namely Lymnea truncatula, which is an intermediate host for Fasciola hepatica.

In Iraq many studies were carried out on snails , some of these are on the biological and ecological aspect (1, 2 , 3, 4, 5 , 6, 7, 8).

The present work is an attempt to measure the population density of L. truncatula to provide a measure for further assessment of the fauna and to provide some aspect of their ecology.

Meterails and Methods

Field work was conducted in a small village (Tholoeiya),100km north Baghdad.

Sampling of snails was carried out in atypical canal about 20km long, 1.5m wide and 30-50cm deep depending on water flow in the canal, which is variable depending on water need in the farms. Usually canals are extensively used in summer when the irrigation is more frequent.

Monthly samples were collected from January 1985 to June 1986 . On each sampling occasion ten replicates were taken along the length of the canal. The canal was divided into ten sub area, 50m apart, and one random replicate was taken from each sub area. Each replicate was obtained with a tube sampler (Cylindrical corer) enclosing an area of 0.02m. The sharp edge of the sampler usually cut through vegetation cover and sediment to a depth of 5 cm. Individual replicates were washed in laboratory using 0.4mm sieve. The number of snail per replicate was then counted and the shell height of evch snail was measured to the nearest 0.1mm by using com-

pound microscope .

Separation of cohorts was obtained by using probability paper (for details of this method see 9).

Result and Discussion

Density and Dispersion

The results of this study indicated that the highest temperature, were recorded in June, July and Augest as shown in (fig. 1). Water conductivity, PH and dissolved oxygen were also measured in the canal. Dissolved oxygen was invariably high, without noticeable correlation with water temperature, this may be a response to the vegetation distribution. Apart form temerature, no obvious correlation between these parameters and snail densities was observed .

The monthly change in the population density of L. truncatula are shown in (fig. 2).

The density ranged between 1.2 + 0.43 in October to 39.2 + 11.3 in May for each 0.02m with two distinct peaks. A major one is in May and a miner peak in November . Peak densities followed recruitment of yong from the breeding seasons of the snails.

Snails seems to be highly aggregated in their spatial distribution . When the value of the slope (b=2.2) of the relationship between the variance and the mean (10) was utilized as an index of aggregation (b=2.2, $p > 0.001$). This may be a response to the vegetation distribution, since snails were always associated with such vegetation, and the irregular change of water level of the canals in which they live.

Size class analysis

The size class of population under study provided a direct measure of the change in population structure , pattern of growth , and life cycle . The total length of the snails shell was used to divide the population into number of size classes. Size class intervals were of 0.5mm, and the distribution in percentage of these size classes was bi to multimodal, indication that at least two cohorts was present at each sampling occasion. Separation of these cohorts was not possible due to the large over lap individual size at the point of contact. The position of the mean size of the separation cohorts is indicated by arrow on (Fig. 3). Most part of the year the population made of two cohorts except in June , November 1985, April 1986 when three cohorts were present .

Cohorts analysis

Cohorts density change can be studied by extracting the data from (Fig. 3). Size classes belonging to one cohorts were amalgamated to give the proportion of thoes cohorts in the total population. These proportion were then converted back to numbers 0.02m and presented monthly in (Fig. 4), to show the high and low density cohorts. The high density cohorts was that recruited in May 1986 and the low density in August, September and October

1985 .

The numbers of L. truncatula in this canal fluctuated seasonally with two peaks . The studies of (11, 12, 13). Have similar pattern in population change . This statement agree with the estimation given by Al-Gindy (14) which showed there are two distinct breeding seasons (March, April and November) for snails in central Iraq , but peak densities occurred at various times depending on the type of habitat studied (pool, stream or marshes) . Several works (15) reported that this snail had classical picture of major peak in late spring and minor peak in late autumn while those studies in drains had a major peak during winter and a minor one in Summer . The above cited studies seem to agree that L. truncatula is characterized by having two annual peaks irrespective of the type of habitat they occupy, but the peak densities varied; probably in response to reproduction and the survival rate of new snail.

Many factors are known to control the timing of breeding season in this snail and consequently the pattern of change in their numbers.

Many workers (16, 17, 18) reported that food availability, rainfall and water temperature were the major factors controlling the population density of the snail.

Food, although not studied , was assumed to be available since algae and decaying organic matter were abundant throughout the year . Rainfall seems to be the important factor determinig the time of breeding season and periods of peak densities, which take place at the time of the year when temperature is optimum .

The study showed that the population of L. truncatula is made of two generation expect for avery short period when the new recruits enter the population (19). Based on field water temperature concluded that Bulinus truncatus in central Iraq have four generation .

The analysis of size frequency distribution (Fig. 3) showed clearly that two generations dominated the population for most of the year and that these two generaton differed in their density (Fig. 4). A high density generation during winter and low density generation during summer.

This study is designed to pave the way for more detailed work on the population dynamics of species inhabiting the area, and to reveal the types of interaction exist between these species.

References

1- AL- Mashhadani, H. M. M. (1970) Morphology and ecology of Lymnaeid snails of Iraq with special refrence to fascioliasis M. SC. thesis. University of Baghdad, Iraq.

2- ALI, T. H. (1979). Some aspects

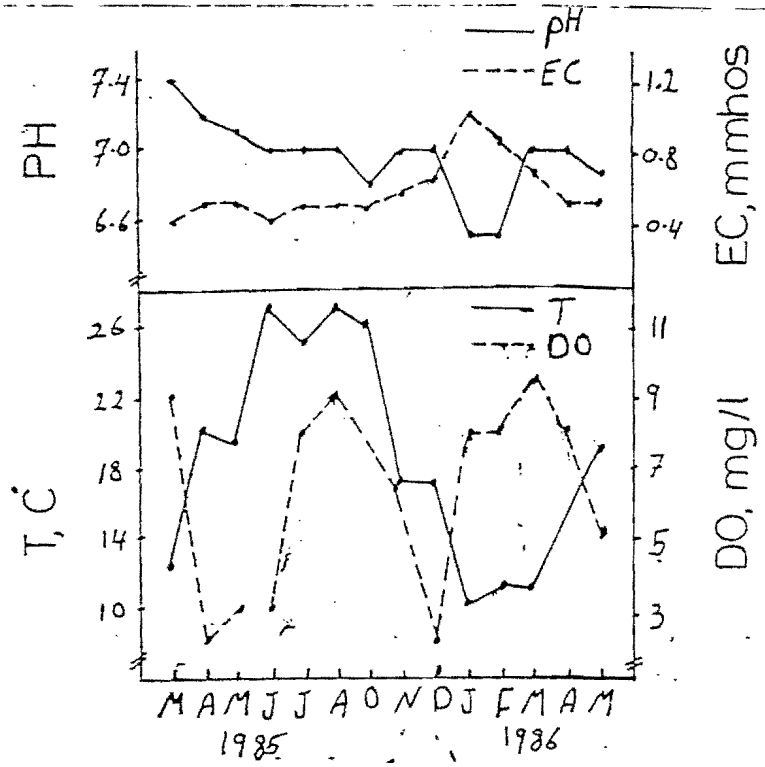

Fig.1 :Mean values of hydrogen ion concentration (PH) dissolved oxygen (DO) ,specific conductance (EC) and surface water temperature (T) in canals .

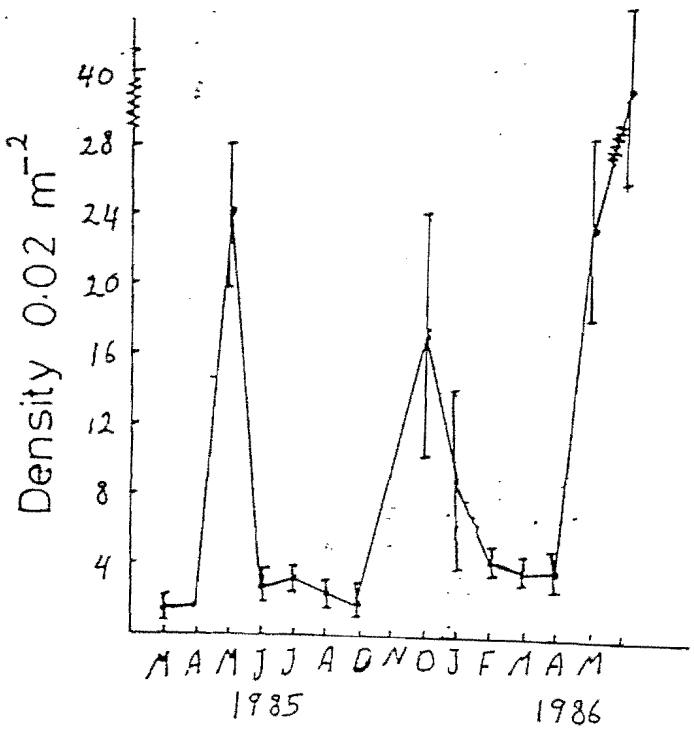

Fig.2 :Monthly change in a bundance (+SE) of L. truncatula in the canals

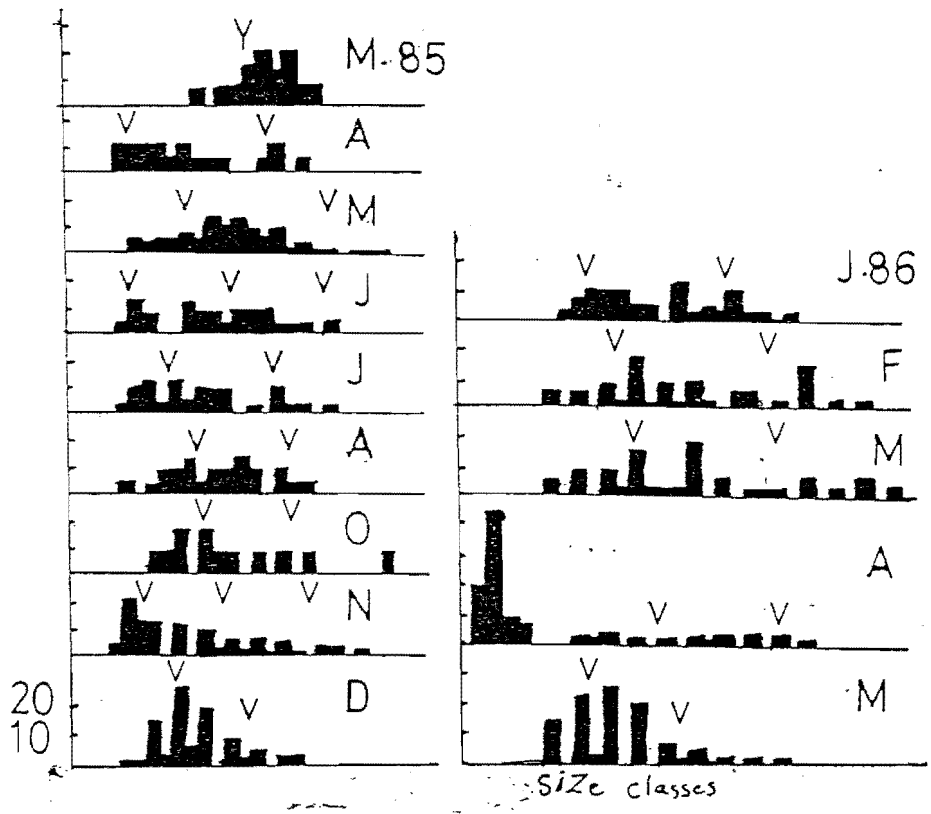

Fig.3 :The size classes distribution in percentages of L. truncatula population .Arrow indicate the position of mean cohort size.

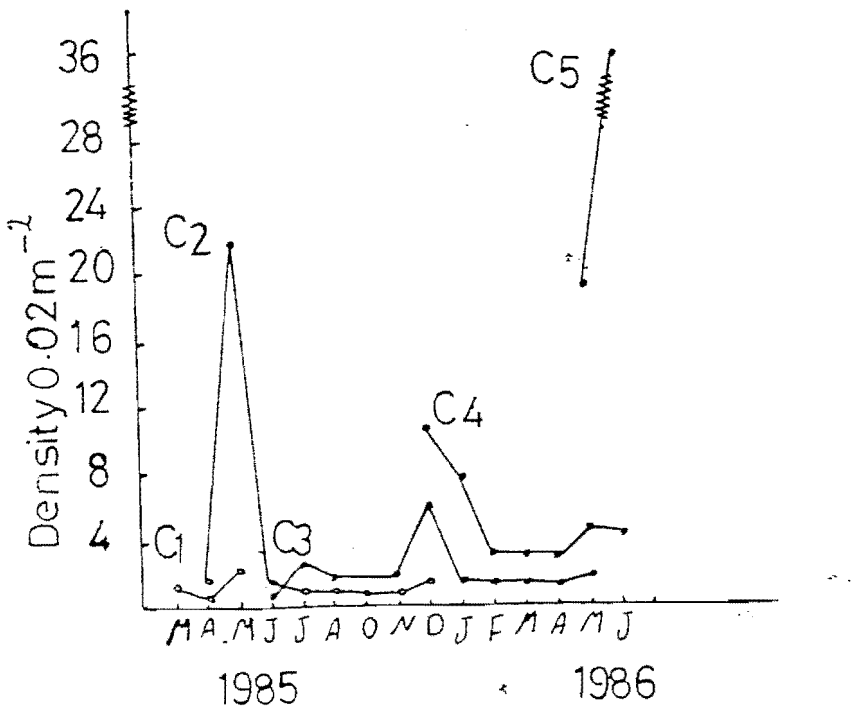

Fig.4 :Density of each of the cohorts of L.truncatula over the period of their presence in the population.

of the fresh water snail Lymnea auricularia (L.) M. SC. thesis. University of Mosul, Iraq.

3- Luke, J. Y. (1982). Puplution dynamics of Theodoxus Jordan (sowerby) in Shatt Al-Arab. M. SC. thesis. University of BM. SC. thesis. University of Basrah, Iraq.

4- Al-Dabbagh, K. Y. and Daoud, Y. T. (1985). The ecology of three gastropod molluscs from Shatt Al-Arab J. Biol. Sci. Res. 16(2) : 155-16B.

5- Hussian, N. A. and Ahmad, T. A. (1983). Seasonal variations in the abundance of some littoral invertebrate species in Shatt al-Arab river. J. Fac. Mar. sci., 3 : 149 - 159.

6- Rabie, A. A. (1986). The ecology of pulmonate snails Lymnea auricularia (L.). and Physa acuta Draparnaud in Shatt Al-Arab. M. SC. thesis. University of BM. SC. thesis. University of Basrah, Iraq.

7- Mohmoud, S. N; Jawdat, S. Z. and Aladhami, B. H. (1987). studies of Bulinus truncatus in Albu-Hishma village with notes on prevalence of urinary schistosomiasis J. Biol. sci. Res. 18:29-42.

8- Al-Dabbagh, K. y.; Mohmoad, S. N.; Akbar, M. M. (1991). The ecology of Bulinus truncatus in irrigation canals Iraq J. Biol. Sci. 1:1-18

9- Harding, J. P. (1949). The use of probability paper for the graphical analysis of polymodal frequency distribution. J. Mar Bio. ASSO., U.K. 28 : 141-153.

10- Taylor, L. R. (1961). Aggrigation, variance and the mean nature, 189 : 732-735.

11-Watson, J. M. (1950). Studies on bilharziasis in Iraq, Part 5, habitat of the vector snail Bulinus truncatus and its distribution in relation to the irrigation systems. J. Fac. Med., Iraq. 141 : 148-182.

12- Watson, J. M. (1951). Studies on bilharziasis in Iraq, Part 6, seasonal variation of the vector snail Bulinus truncatus. J. Fac. Med. , Iraq.

13- Chu, K. Y.; Massoud, J. and Aarfaa, F. (1968). Distribution and ecology of Bulinus truncatus in Khuzestan Iran Bull. wldhlth.org. 39 : 607-637.

14- Al-Gindy, M. S. (1966). Studies on the biology and ecology of Bulinus truncatus (intermediate host of urinary bilharziasis in central Iraq with suggestion for control Bull. End. Dis. 8(1/4) : 103-124.

15- Dazo, B. C; Hirston, N. G. and Dawood, L. K. (1966). The ecology of Bulinus truncatus and Biomphalaria Alexandrina and its implication for the control of bilharziasis in Eygept -49 project area Bull. wld Hlth. org. 55 : 339-356.

16- Webbe, G. (1962). The transmission of Schistosoma haematobium in and area of lake proince, Tangan-Yika. Bull. wld Hlth. Org. 7:59-85.

17- O'Keeffe, J. H. (1985-a). Population biology of fresh water snail Bulinus globosus on Kenya Coast. I. population fluctuation in relation to climate. J. Appl. Ecol. 22 : 73-84.

18- O'Keeffe, J. H. (1985-b). Population biology of fresh water snail Bulinus globosus on Kenya Coast. II. feeding and density effect on population parameters. J. Appl. Ecol. 22:85-90.

19- Radhawy, I. (1973). Bulinus truncatus and its control in Iraq. Study on ova and cercariae of Schistosoma haematobium. Bull. End. Dis 14:27-61.