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THE EFFECTS OF TEMPERATURE ON THE LIFE-CYCLE OF THE FRESHWATER SNAIL LYMNAEA (RADIX) IN NAGAPUR RESERVOIR, PARLI-VAIJNATH, DIST. BEED (MS)

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ABSTRACT:-

The present communication deals with the effects of thermal on the life cycle and other important parameters on the snails Lymnaea (Radix). It isexhibited marked variations in growth, longevity, and attaining sexual maturity at different temperatures and diets. At 10°C, irrespective of foods, pH and salinity of water, the snails had minimum life span, maximum death rate and lowest growth rate. At 15°C,

In the experiment we find that the growth rate was comparatively higher and the snails survived for a few more days. But at these temperatures they failed to attain sexual maturity. Snails exposed to pH 5 and 9 at 20°, 25°, 30°, 35°C and room temperatures (19.6°-29.6°C); to 0.5, 1.5 and 2.5 NaCl ‰ at 20° and 35ºC; to 2.5 NaCl ‰ at 25°C and room temperatures failed to attain sexual maturity. The snails exposed to pH 7 and different salinity grades at 20°, 25°, 30°, 35°C and room temperatures became sexually mature between 25-93 days depending upon the type of foods used in the culture. The present paper also shows the effect of temperature on the growth and the life cycle of the Snail Species Lymnaea (Radix)

KEY WORDS: *Temperature, Lymnaea (Radix) , life-cycle parameters , food - pH – salinity, Nagapur reservoir, Parli-V.etc.*

INTRODUCTION:

In the present communication it was designed to collect detailed information on the life-cycle parameters viz., the growth rates, the age of attainment to sexual maturity, the duration of reproductive period, the rate of egg production, the death rate and the life span of *Lymnaea (Radix)*), in order to consider the cumulative effects of these different ecological parameters. Since *Lymnaea* are adapted to a wide range of temperatures (Walter 1968, Prinsloo& Van Eeden 1969) the aim was to study the effect of temperature on the snails *L.*

The *Lymnaea* are distributed worldwide (Godan 1983). They have drawn the attention of a large number of researchers because of their role as hosts for larval stages of the helminth parasites which cause disease in man and domestic animals (Liston &Soparkar 1918, Rao 1933, Chatterjee 1952, Malek& Cheng 1974, Ghosh & Chauhan 1975, Godan 1983, Burch 1985, Raut 1986). Considering their involvement in regulating the life-cycle of the worm parasites various aspects of the biology and ecology of these freshwater gastropod snails were studied by Seshaiya (1927), Noland and Carriker (1946), Kendall (1953), McCraw (1970), Berrie (1965), Burla and Speich (1971). Van der Steen et al.(1973), Hunter (1975) Raut et al. (1992), Raut and Misra (1993), and Misra and Raut (1993) with a view to developing methods for control.

MATERIALS AND METHODS:

27 healthy sexually mature *L.* are collected from the Nagapur Reservoir near Parli-V. region in Beed district. They were released into an aquarium 30 x 20 x 25 cm, containing pond water, 20 cm in depth. A few phytoplanktons were also released into the water of the aquarium to provide resting and egg laying sites for the snails.

The snails were regularly supplied with lettuce leaves, as food. The snails started egg-laying within a few days. The egg capsules were collected on a daily basis from the aquarium, and kept inside glass jar containing pond water. In one glass jar 7-10 egg capsules deposited within a 24 hr period, were kept together. The water in the glass jars was changed regularly with fresh pond water. Through regular observation newly hatched snails were taken daily from the jars.

These newly hatched snails were placed in a plastic container containing pond water. The containers were kept at 10°, 15°, 20°, 25°, 30°and 35°C (± 1°C) temperatures (maintained in Biological Oxygen Demand Chamber), and at room temperature (19.6°-29.6°C) in order to study the effect of these temperatures on the *L. (R.).* The experiments were conducted (i) using five different types of food viz. lettuce (*Lactuca sativa*), mustard (*Brassica nigra*), radish (*Raphanussativus*), spinach (*Spinaceaoleracea*) and aquatic weeds (*Chara, Vallisneria*), (ii) by maintaining three different levels of pH, viz. 5, 7 and 9 in the culture water and (iii) by maintaining three different grades of salinity viz 0.5, 1.5 and 2.5 NaCl ‰.

The snails under experimental study with different pH and salinity grades were fed lettuce. The water in the containers was changed regularly at an interval of 12 hr in order to maintain the pH and salinity at desired levels. The pH was maintained by adding HCl and NaOH, and the salinity was maintained by adding HCl to the freshly collected pond water at an interval of 12 hr. A few examples of *Ipomoea* were kept in each container to provide resting and egg-laying sites for the snails.

In the case of the study of egg-laying potential, the total numbers of egg capsules produced by the snails in the container were recorded daily. The number of eggs present in these capsules was also counted and recorded. In all cases the average was calculated for presentation of final data in respect to the life-cycle parameters considered for study.

RESULTS:

L. (R.) had different life spans when cultured at different temperatures in respect to the type of food they consumed and the pH and salinity of the maintenance water. They exhibited marked variation in the rates of growth, in shell length, shell breadth and body weight when reared at different temperatures. In general, body weight increased with the increase of temperature from 10° to 35°C, at intervals of 5°C. But the snails attained maximum body weight per day when maintained at room temperatures. Though a similar trend in the growth rates in shell length and shell width is noted in snails maintained from 10° to 30°C, slight variations in the rate of increase were seen in individuals exposed to 35°C and room temperatures.

The snails in the remaining cultures became sexually mature between 25 and 93 days after hatching and the percentages of such snails varied from 6.70 to 70.00. Individuals maintained at 1.5 NaCl ‰ under room conditions with lettuce as food, reproduced on an average, only for a period of 8 days, while those reared at 20°C with radish leaves as food reproduced for a period of 61.50 days.

The snails exhibited the lowest growth rate at 10°C. An increasing rate of growth is evident with the rise of temperature. Detailed comparison on the effect of all other higher temperature in respect to 10°C, to determine the optimum temperature for growth, reproduction and development. From the values it is evident that temperature has significant effect on these events in *L. (R.)* in respect to the type of foods used and the pH and salinity grades maintained.

DISCUSSION & CONCLUSION

In these experiments the snails exhibited marked variations in the rates of growth in shell length, shell breadth and body weight. In all other experiments the snails were able to complete their life-cycle

although significant variations in the rates of growth, multiplication and survival have been noted in respect to the temperatures of the waters of the containers concerned. Also, in most cases the effects of temperature on the life-cycle parameters of *L. (R.)is* influenced by the factors like quality of food, pH, and salinity of water used in experiments.

Temperature is considered as a critical environmental factor in the ecology of most organisms (Precht et al. 1973, Magnuson et al. 1979, Vianey-Liaud 1982, Ahmed &Raut 1991, Raut et al. 1992). It can act as both a trigger for the commencement of a biological process and as a threshold essential for its continuation. The results of the present study are in agreement with the comment of previous workers so far as the influence of temperature on the biology of *L.(R.)* is concerned. It is evident that *L. (R.)* is unable to complete its life-cycle at 10° and 15°C temperatures, irrespective of the foods it consumes, and the pH and salinity grades maintained.

Since anomalies in longevity in snails cultured at different pH and salinity of water are well marked at identical temperatures with identical food supply (lettuce) it is assumed that, at least pH and salinity (since other factors have not been considered in the present study) play important roles in the life process.

In present research the findings are in agreement with earlier observations although variations in hatching percentages of the eggs produced by the snails, reared at the same temperature, but fed with different foods, are recorded for the first time. This may be explained by the relationship of stored nutrients in the eggs, to the type of foods consumed by the mother snails concerned. As hatching success of the eggs varied with the pH and salinity grades it is obvious that these factors have significant influence to alter the beneficial effects of temperature, to a certain extent.

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