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EFFECT OF SALINITY ON SURVIVAL AND LARVAL DEVELOPMENT OF THE AFRICAN RIVER PRAWN, MACROBRACHIUM VOLLENHOVENII (HERKLOT'S 1857) OF THE CROSS RIVER ESTUARY.

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ABSTRACT

Laboratory investigations was conducted to gain a better insight into the effect of changing salinity regime on the development and survival of Macrobrachium vollenhoveii larvae. At water temperature of 28 ± 2°C, larvae reared in the salinity range of 0 to 10 ppt showed low survival (<48%), whereas those reared at 12-28 ppt salinity range revealed over 60% survival. Development of larvae to post larvae occurred after 43 to 63days. These results provide a basis for capture and stocking of larvae and juveniles of the species in the pond.

Running Head: Effect of salinity on M.vollenhovenii larvae

KEYWORDS: Cross river, estuary M.vollenhovenii, survival salinity, Nigeria.

INTRODUCTION

Aquatic species respond to salinity stress in different ways, e.g. escape withdrawal and regulation or adaptation (Kinne, 1966). Studies which have considered salinity tolerance of *Macrobrachium* larval stages are limited. Choudhury (1971a,b) showed that freshwater is even lethal to *Macrobrachium carcinus* zoea 1, and that the duration of moulting in most other species of *Macrobrachium* is adversely affected by salinity (Moreira et al 1979). For some species, such as *M. potiuna*, larval development is independent of salinity (McNamara et al., 1991).

An experimental study on the effect of salinity on the survival and development of *M.vollenhovenii* from the Cross River, S.E. Nigeria is the subject of this communication. *M.vollenhovenii* is a freshwater prawn which also inhabits low-salinity brackish water as adults and juveniles. The species has a very high culture potential in West Africa.

MATERIALS AND METHODS

Adult female specimens of *M. vollenhovenii* from the Cross River were acclimatized in the laboratory, from which only those with freshly laid eggs were selected. The specimens were allowed 2 weeks adjustment to increasing salinity; 0, 8, 10, 12, 14, 16, 20, 24, 28, 32 ppt following the method of Schlieper (1958). These salinities were obtained by dilution of water with the salinity of 32 ppt with appropriate amounts of fresh water. Fifty vials, each with individual larvae, were tested at room temperature (28 2.0°C). The vials are 50ml- cylindrical polystrol Transparent vessel (45 mm high and flat bottom).

Each vial was filled with 40 ml of test media kept without aeration. Evaporation was always anticipated according to Willfuhr-Nast et al. (1993) who showed that salinity of water kept under conditions similar to those of this study increase by a factor of 6 in 24 hrs, provided the temperature range is within 28°C and the salinity between 8 and 32 ppt.

Inspection of vials for moult exuviae and dead animals was carried out daily during which time larvae were also fed and transferred into clean vials. Specimens were fed with brine shrimps, *Artemia salina* naupli at a density of 7-10 nauplii per ml. Studies were concluded when survival of the experimental animals reduced below 50% after 30 days of study. i.e. beyond the mid-life cycle of the larvae.

The life span of larvae from zoea 1 was also observed in a mass culture experiment in a 40-litre recirculating water tank with 14 ppt salinity according to the method developed by Aquacop (1977) for the rearing of *M.rosenbergii*. Specimens were fed with *Artemia* nauplii twice daily. From the third larval stage, larvae were fed, in addition, with an artificial food whose composition was: 55% protein, 16% fat, 5% ash, 8% water.

For each set of vial, length measurement were made from the first day on 20 specimens till 30 days, after which the measured specimens were reduced to 10. The specimens were anaesthetized to immobilize them and to facilitate length measurements. The experiment lasted for 63 days.

RESULTS

Survival rates were high and insignificant (Anova Fs = 0.43; 8 and 50 df) ($p>0.05$) in 12-24 ppt salinity. However, the specimen in salinities 8, 10, 30 and 32 ppt showed poor survival and growth (Fig. 1) More zoea stages were found in these unfavourable salinities. Figure 2 also show that higher larval stages and larger larvae occurred in high salinity (e.g. 16 ppt) and more lower larval stages and smaller specimens in lower salinities (e.g. 8ppt). Fifty per cent of the 6000 Zoea 1 larvae (1.42 1.60mm in length) which were mass cultured in 14 ppt salinity developed into post larvae, measuring 8.04 mm in length, between 45 65 days (Fig. 3).

DISCUSSION AND CONCLUSION

This study suggests that *M.vollenhovenii* larvae belong to the marine and brackish water species, producing many small eggs (Udo & Ekpe, 1991), which develop through numerous larval stages (Fielder, 1970) as is evident from this study (Fig. 2).This study also show that *M.vollenhovenii* larvae cannot develop in fresh water except in salinities ranging between 12 and 28 ppt, as compared with lower salinities and 30 ppt and above. (Fig. 1).Salinities of 12 28ppt also favoured the growth of the larvae into post larvae. The larvae of the species when mass cultured in 14ppt developed into post-larvae within 45 to 63 days (Fig. 3).

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The requirement for saline water probably accounts for the rarity of female *M.vollenhovenii* in fresh water, except in those areas of the Cross River where access to more salty conditions is easy. The results of this study also provide the basis for the rearing of larvae, capture and stocking of the post- larvae of *M.vollenhovenii* in ponds.

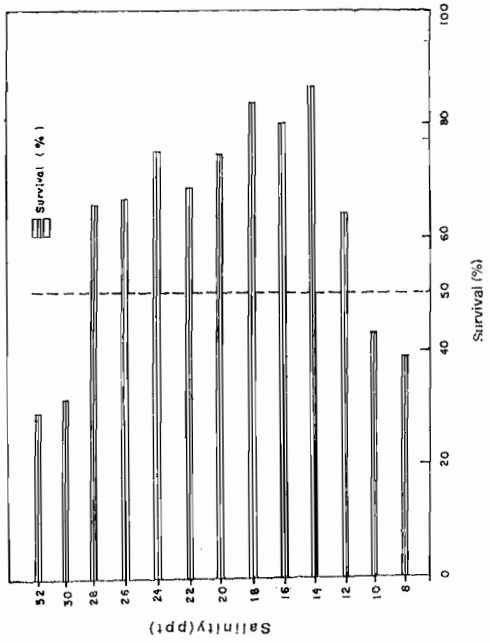

Fig. 1: *Macrobrachium vollenhovenii* : survival of larvae in various salinities.

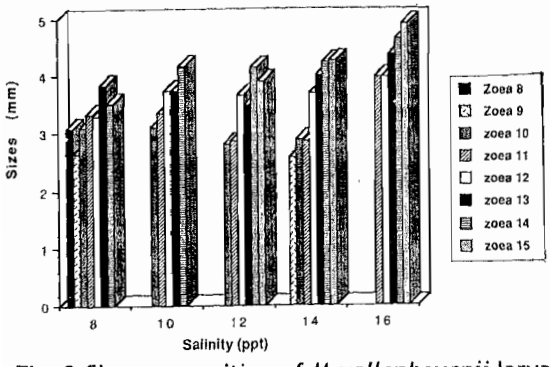

Fig. 2:Size composition of *M.vollenhovenii* larvae in some salinities.

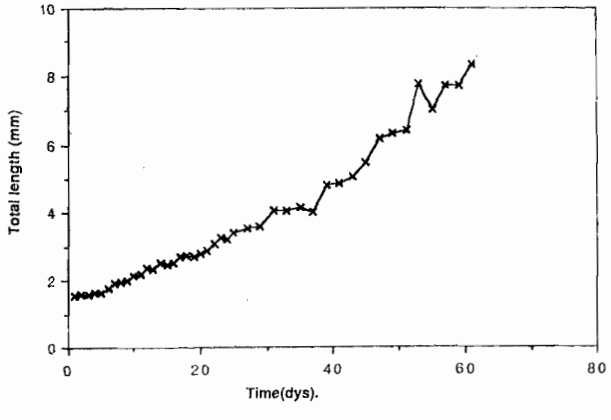

Fig. 3:Growth of *M.vollenhovenii* larvae with time in culture (mass) tanks.

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