

**EFFECT OF LOWER SALINITIES ON GROWTH AND SURVIVAL  
OF EARLY JUVENILES OF THE KING PRAWN  
*PENAEUS LATISULCATUS* KISHINOUE UNDER LABORATORY CONDITIONS**

**ABSTRACT**

Early juveniles of the King prawn *Penaeus latisulcatus* reared in 34.12 ppt tolerated lower salinities of 10 to 25 ppt without acclimatisation, whereas cent percent mortality was recorded in 0 ppt and 40% in 5 ppt. In the case of prawns acclimatised to salinities of 5, 10, 15, 20 and 25 ppt, the percentage of survival during one month rearing was 6.7, 40.0, 73.3, 93.3 and 86.7 respectively. In terms of growth per month, the prawns reared in 15-25 ppt salinities recorded a higher growth of 7.7 to 9.5 mm as against 4.1 to 5.7 mm in 5-10 ppt. The significance of these experimental results in the context of farming of this species is briefly discussed.

AMONG the environmental parameters, salinity and survival (Zein-Eldin, 1963; Zein-Eldin and Aldrich, 1965; Zein-Eldin and Griffith,

1969; Venkataramaiah *et al.*, 1972; Nair and Krishnankutty, 1975; Suseelan, 1977; Motoh, 1981; Paulraj and Sanjeevaraj, 1982; Ramasamy and Paul Pandian, 1985; Kulasekharapandian *et al.*, 1986) and distribution (Rao, 1973; Suseelan, 1977; George and Suseelan, 1982) of postlarval and juvenile penaeid prawns. In order to find out the suitability of hatchery raised early juveniles of the King prawn *Penaeus latisulcatus* Kishinouye for brackish-water farming, an experiment was designed to study their tolerance to lower salinities ranging from 0 to 25 ppt and the results are presented here.

salinities were 0, 5, 10, 15, 20 and 25 ppt. In the first treatment, a batch of 5 prawns for each salinity was introduced without acclimation into a 6 litre capacity round plastic basin, where fine sand was spread on half the floor area of the basin to suit the burrowing habit of the species, and their behaviour and survival was noted for 24 hours. In the second treatment, 3 batches for each salinity were reared after acclimating in the respective salinities (except zero salinity) for a period of 30 days, during which time, the prawns were examined and measured for their growth every 5-days. The prawns were fed *ad libitum*

TABLE 1. *Survival and behaviour of early juveniles of P. latisulcatus in different salinities without acclimatisation*

Salinity (ppt)	Behaviour	Within 1 hr	Survival of Prawns Between 1-2 hr	Between 2-24 hr	Survival %
0	Did not bury under the sand; lifted their abdomen and stood vertically				
5		1 dead	Rest 4 dead	—	Nil
	Except 2 dead ones, rest buried	1 dead	1 more dead Rest 3 normal	Rest 3 normal	60
10	Except 1, all buried	1 less active	1 dead	Rest 4 normal	80
15	All buried	All normal	All normal	All normal	100
20	-do-	-do-	-do-	-do-	100
25	-do-	-do-	-do-	-do-	100

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Thirty day old hatchery-reared juveniles of *P. latisulcatus* from a single brood raised in seawater of 34.12 ppt ranging in size from 16 to 23 mm in total length (av. length 18.9 mm) were used in the experiments. The tested

at 1800 hrs every day with the boiled meat of the green mussel (*Perna viridis*). The temperature in the rearing containers ranged from 26.7 to 28.2°C.

*Treatment No. 1:* The details of the number of early juveniles of *P. latisulcatus* that survived and their behaviour in different salinities are given in Table 1. It is seen that at 0 and 5 ppt, all the prawns remained out of sand and during the first 30 minutes after introduction,

the prawns lifted their abdomen, stood vertically and revolved, indicating an abnormal and laid down on the bottom of the basin, and died in another 15 minutes. In the case

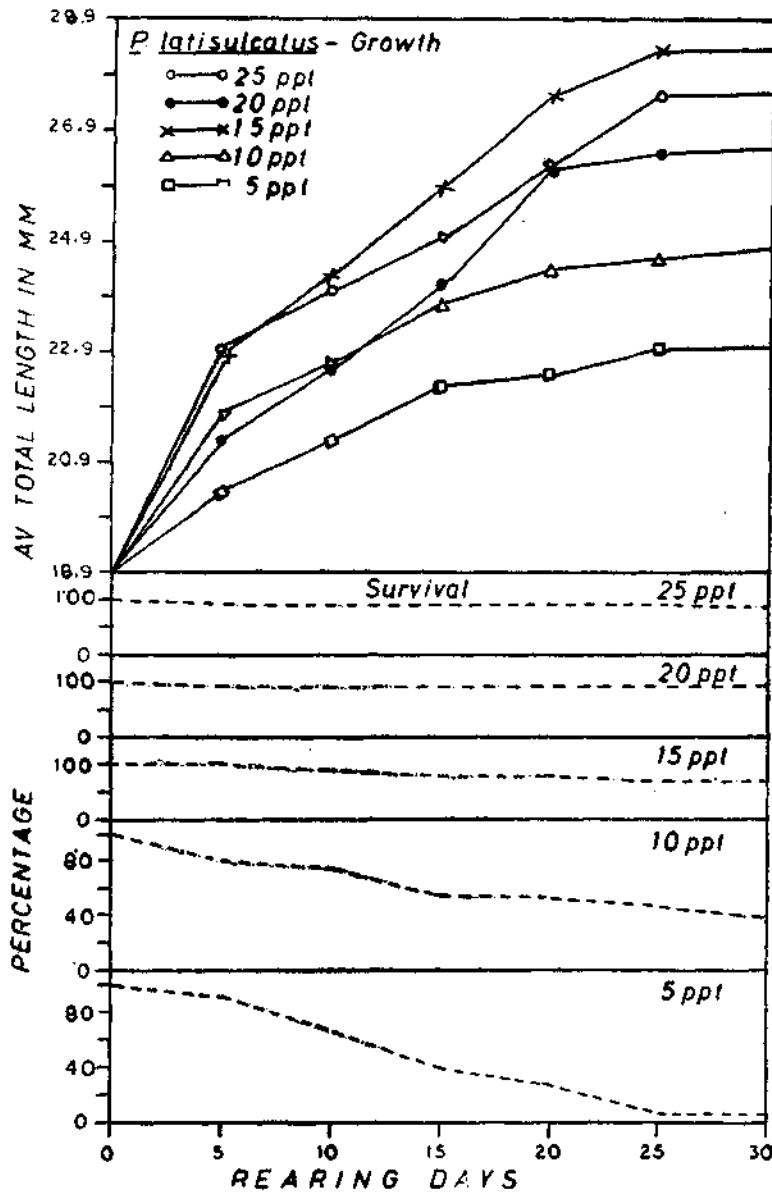


Fig. 1. Growth and survival of early juveniles of *P. latissulcatus* in different salinities.

behaviour. After the lapse of 45 minutes, one of 10, 15, 20 and 25 ppt, all prawns (except prawn each in 0 and 5 ppt stopped activity one in 10 ppt) remained buried. Total

mortality was observed in 0 ppt, while 40% and 20% mortality was witnessed in 5 and 10 ppt respectively within 2 hours of transfer to these salinities. By the end of 24 hours, no further mortality was noticed in 5 and 10 ppt, whereas 100% survival was seen in 15 to 25 ppt.

*Treatment No. 2:* The acclimation of early juveniles of *P. latisulcatus* was carried out by gradually adding freshwater and it took 1 hr 15 min., 2 hrs, 2 hrs 30 min., 3 hrs 15 min. and 4 hrs to reduce salinity from 34 ppt to 25, 20, 15, 10 and 5 ppt respectively. The growth attained and number that survived at 5-day intervals in different salinities are depicted in Fig. 1. During the 30-day rearing, those reared in 15 ppt exhibited a maximum growth of 9.5 mm, followed by prawns in 25 ppt (8.7 mm), 20 ppt (7.7 mm), 10 ppt (5.9 mm) and 5 ppt (4.1 mm), thus showing a distinct growth pattern, viz. greater growth in 15-25 ppt and lesser increment in 5-10 ppt.

There was no mortality till the 4th day of rearing when one prawn each in 5, 20 and 25 ppt died either due to cannibalism on moulted specimens or jumping out of the container. Further mortalities had occurred in all the salinities in the aforesaid manner throughout the period of observation. In all, the highest survivals were recorded in 20 and 25 ppt (86.7

to 93.3%), closely followed by 73.3% in 15 ppt. The survival was less in 10 ppt (40.0%) and least in 5 ppt (6.7%).

The present study has shown that early juveniles of *P. latisulcatus* could thrive well either with or without acclimatisation in lesser salinities of 15 to 25 ppt. However, the growth rate recorded in different salinities has suggested that a salinity of 15 ppt is needed for optimum growth of the early juveniles.

Earlier study on the salinity tolerance of juveniles of *P. latisulcatus* by Ramasamy and Paul Pandian (1985) has indicated a salinity value of 0 to 10 ppt as lethal, whereas, Suseelan and Kathirvel (1982) have recorded the juveniles of the same species from an estuary having 9-14 ppt salinity. The present record of 60 to 80% survival in 5-10 ppt salinity without acclimatisation supports the findings of Suseelan and Kathirvel (1982). Further, Motoh's (1981) record of 36 to 78% of survival of postlarvae of *P. latisulcatus*, *P. japonicus* and *P. longistylis* in 5-10 ppt salinity has lent support to the view that early juveniles of *P. latisulcatus* are euryhaline to a greater extent and could be considered advantageously as one of the candidate species for penaeid prawn culture in our coastal waters.

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## REFERENCES

- GEORGE, M. J. AND C. SUSEELAN 1982. *Proc. Symp. Coastal Aquaculture, Mar. Biol. Ass. India*, 1: 273-284.
- KULASEKHARAPANDIAN, S., A. R. THIRUNAVUKKARASU AND M. S. MUTHU 1986. *Natl. Symp. Est. Biol.*, Parangipettai, Abstract No. 18.
- MOTOH, H. 1981. *SEAFDEC Tech. Rep.*, 7: 1-128.
- NAJR, S. R. S. AND M. KRISHNANKUTTY 1975. *Bull. Dept. Mar. Sci. Univ. Cochin*, 7 (1): 181-184.
- PAULRAJ, R. AND P. J. SANJEEVARAJ 1982. *Proc. Symp. Coastal Aquaculture, Mar. Biol. Ass. India*, 1: 236-245.
- RAMASAMY, A. AND AL. PAUL PANDIAN 1985. *First Intl. Conf. on the culture of penaeid prawns, shrimp SEAFDEC, Philippines, Poster No. 10.*
- RAO, P. VEDAVYASA 1973. *Proc. Seminar on mariculture and mechanised fishing*. Dept. Fish., Tamilnadu pp. 67-69.
- SUSEELAN, C. 1977. *CMFRI Ann. Rep.* 1977, p. 93-95.
- AND M. KATHIRVEL 1982. *Indian J. Fish.*, 29: 71-78.
- VENKATARAMAIAH, A., C. J. LAKSHMI AND C. GUNTHER 1972. *Proc. World Maricult. Soc.*, 3: 267-283.
- ZEIN-ELDIN, Z. P. 1963. *Biol. Bull. (Woodshole)*, 125 (1): 186-196.
- AND D. V. ALDRICH 1965. *Ibid.*, 129: 199-216.
- AND G. W. GRIFFITH 1969. *FAO Fish. Rep.*, 57 (3) : 1015-1026.