ON THE ADVANTAGES OF DOMESTICATION OF THE INDIAN WHITE PRAWN, *PENAEUS INDICUS*

M. S. Muthu, K. H. Mohamed, N. N. Pillai,
A. Laxminarayana and S. K. Pandian
Central Marine Fisheries Research Institute, Cochin 682031.

Abstract

The Indian white prawn, *Penaeus indicus*, a highly desirable species for culture, has been domesticated at the Marine Prawn Hatchery Laboratory of CMFRI, at Narakkal. Following the techniques developed at the Laboratory to induce them to breed in captivity and to rear them through all the stages of its lifehistory in the farm itself, five successive generations were raised at the MPHL. The advantages of this kind of domestication in large-scale over the conventional culture of this prawn are briefly discussed in this note.

Culture of marine penaeid prawns, being a practice of comparatively recent origin, does not as yet involve domestication. The method followed is that the prawn seed either collected from the wild or produced in hatcheries from spawners caught from the wild being cultured in grow-out facilities. In such a culture practice the seed has to be perforce obtained afresh from these sources for each crop; which means basing the culture, with all its liable consequences, on the uncertain wild population. However, in the last decade, there were some attempts to free prawn culture altogether from the tedious and time-consuming, and often fruitless, dependence on the wild by breeding prawns in captivity and maintaining them in controlled culture facilities generation after generation, though documented cases of such domestications are very few in number. Aquacop (1979, 1980) had reared *Penaeus monodon, P. vannamei* and *P. stylirostris* over many generation in Tahiti. Beard et al (1977) had maintained *P. merguiensis* for three generations at the Conwy laboratory. Primavera et al (1982) had cultured *P. indicus* in captivity for two generations in the Philippines At the farm of the Marine Prawn Hatchery Laboratory (MPHL) of the CMFRI, where methods had been evolved to complete the entire life-cycle of *P. indicus*, five clearly successive generations had been maintained before a breach in the pond-dyke caused a mixing up of stocks.

The methods by which these generations were maintained are, briefly as follows. Pond-grown *P. indicus* were induced to mature and spawn in captivity at the MPHL by unilateral eyestalk ablation, and the larvae were reared in the laboratory up to postlarval stage. The postlarvae then were transferred to the nursery, where they were raised till stocking size. The methods by which these various stages were derived are those described by Silas et al (1985). The juveniles were stocked at a rate of 5 Nos. |m sq. in the brackishwater ponds (of area 0.02-0.6 ha) attached to the MPHL. Before stocking, the ponds had been treated with ammonia to weed out all the endemic prawns and fishes. After the stocked prawns reached marketable size (120-130 mm), they were harvested. Some of these prawns were again released into the same pond for further growth. When they attained a size of 145-155 mm, these prawns were caught and were induced by unilateral eyestalk ablation to mature and spawn in the maturation facility. This parent stock spawned and the larvae once again reared, as before, successively in the hatchery and in the nursery, the juveniles were again stocked in the pond and grown into adults. This cycle was repeated five times and five generations were maintained one after the other, when, upsetting the experiment, the breach had happened.

The details about the five generations of *P. indicus* thus raised are given in Table 1. The nauplii that had hatched out of the eggs produced by the eye-blated females metamorphosed into postlarvae in about 10 days. The nursery phase varied from 20 to 70 days and the grow-out phase took 77 to 245 days. The great disparity in the length of time taken in the grow-out ponds had been due to the environmental factors widely differing in the ponds from time to time. Growth was fastest in the 0.6 ha pond (at the third generation), where the salinity had varied from 10 ppt to 21 ppt, and slowest in the 0.05 ha pond (fourth generation), where the salinity had declined sharply after May, during the SW monsoon, and then on had remained low (3 ppt-5 ppt) till the end of November.

TABLE 1. *Details of spawners which were the progenitors of each generation.*

	GENERATIONS				
	First	Second	Third	Fourth	Fifth
Size of eyeablated female T.L. (C.L.) mm	152.(32.0)	152(32.5)	150(32.0)	140(30.0)	156(33.5)
Date of eyestalk ablation	4-11-80	30-4-81	24-10-81	1-3-82	1-12-82
Date of spawning	7-11-80	4-5-81	28-10-81	4-3-82	6-12-82
Date of becoming PL1	17-11-80	14-5-81	9-11-81	12-3-82	16-12-82
Date of stocking in ponds	13-12-80	23-7-81	14-12-81	1-4-82	17-1-83
Av. size of prawns at stocking T.L. mm	26.5	44.7	22.4	13.5	20.4
Size of stocking pond (ha)	0.02	0.6	0.6	0.05	0.1
Date of collection of adult from pond for eyestalkablation	30-4-81	24-10-81	1-3-82	1-12-82	Bund breached on 2-3-83 and the stock got mixed up with prawns from other sources.

The shortest time span between two successive generations (i.e. egg to egg) was about 4 months and the longest was about 9 months. Although induced it was, by eyestalk ablation, that the females had spawned at the age of 4 months, in nature, under more favourable conditions, it is possible that they might spawn even earlier. Rao (1968), for example, stated that the smallest mature female observed by him in the commercial catches from the sea had been 134 mm—from the growth data for *P. indicus* cultured in the ponds, a prawn of this size could be 3½-4 months old.

The system of domesticating prawns itself has many advantages. The foremost is that it facilitates introduction of desirable species exotically in areas where they are not endemic. This, in fact, was the aim of Aquacop (1979) and Beard et al (1977). But, even in the places where the desirable species are available, domestication helps to maintain a broodstock, which can be made to mature and spawn as and when required for year-round production of seed. The last, but not least, is that in the long-run, if not immediately, the domestication, as is generally seen in the case of all prolonged domestication, whether it be animals or plants, is most likely to engender a stock which can easily thrive in the highly changing farm conditions such as salinity, temperature and pH. The wild ones, on the contrary, are easily susceptible to the numerous diseases and vulnerable to the viscissitudes, man-made and otherwise, associated with intensive farming. The question how the domestication improves the sturdiness of the stock—whether by a process of gradual natural selection of those which are inherently adapted for the new conditions or by the genetic makeup best suited for the new conditions alone being handed over to the coming generation—is, however, still not answered.

It may nevertheless be borne in mind that the domestication may have its own disadvantages, too. It is possible that, after many generations of inbreeding, the genetic viability of the species may be affected leading to loss of vigour. However, it is too early to make any definitive conclusion about the good and bad effects of domestication of *P. indicus*, as the data at hand are too meagre.

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