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POND PRODUCTION OF THE FRESHWATER PRAWN, *MACROBRACHIUM MALCOLMSONII* IN SINDH, PAKISTAN

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Freshwater prawn, *Macrobrachium malcolmsonii* (Milne Edwards) was cultured at two sites in Thatta, Sindh. The juvenile prawns were collected randomly from the lower belt of river Indus at Hilaya, were sorted and stocked in two ponds at Mirpur Sakro and two at Chilya after acclimatization. They were fed supplementary feed containing about 19% protein once daily. Hydrological characteristics (Dissolved Oxygen, pH and Temperature) of ponds were recorded regularly. The stocked prawns grew from a mean weight of 3.5, 3.5, 8.0 and 5.0 g to 55, 61, 63 and 30 g in 251, 142, 253 and 147 days respectively, under the conditions described herein. A production level of 765, 658, 754 and 217 kg ha⁻¹ respective to each pond was achieved.

Key words: Prawn aquaculture, Ponds, Pakistan.

Introduction

The freshwater prawn, *Macrobrachium malcolmsonii* (Milne Edwards, 1844) has substantial potential as a major species for commercial aquaculture in Pakistan. Scientists at Pakistan Agriculture Research Council (PARC), Islamabad have been working on rearing and culturing of this prawn in laboratory at Karachi and in ponds at Thatta and Islamabad. The research completed so far indicated the bright prospects for the culture of this prawn on commercial scale in Pakistan. There is also a dire need of prawn hatchery in Pakistan.

Growth of *M. malcolmsonii* in ponds is considerably reduced at low temperature. The successful outdoor culture of this species depends greatly on climatic conditions. The growing season is 8-9 months in Islamabad (Yaqoob 1994 b). The production level of the Malaysian prawn, *M. rosenbergii* also depends on length of the growing period, the optimal conditions for culture such as stocking density, size and pond management (Smith *et al* 1976; Willis and Berrigan 1977). The present paper is based on the results of prawn culture experiment achieved under Productivity Enhancement Programme (PEP) of the Government of Pakistan. A Production level of 599 kg ha⁻¹ has been achieved during the present study as against 563 kg ha⁻¹ (Yaqoob 1994a). The data contained herein is of immediate use for prawn farmers to enhance the production of prawns.

Materials and Methods

Pond sites. Grow-out studies were conducted in two areas of Thatta. Two ponds at Mirpur Sakro (106 km from Karachi)

and two at Chilya (118 km from Karachi) were acquired for this purpose. Physical characteristics of these ponds are shown in Table 1.

The ponds at Mirpur Sakro were sparsely vegetated. Water to these ponds was fed under gravity from a large canal to a small canal and then to the ponds through inlet pipe (23 cm dia). Water to the ponds at Chilya was pumped from an adjacent lake (10 ha), which was fed by the same large canal as at Mirpur Sakro. Water was added to these ponds to make up the volume. All water entering to ponds passed through fine mesh nylon netting.

Pond management. Ponds were drained, cleaned and disinfected with lime at 100 kg pond⁻¹. Later, urea and di-ammonium phosphate were applied @ 50:50 kg to each pond to induce phytoplankton blooms and reapplied fortnightly @ 10:10 kg to each pond for maintaining satisfactory growth of algal blooms.

Stocking. A total of 18,043 juvenile prawns were acclimated then stocked in ponds and subsamples of 100 prawns per pond were randomly selected for length and weight measurements before stocking. Prawns were weighed on an electric balance and measured by a scale from tip of the rostrum to the end of telson. Information on the number, density and size of prawns stocked is summarized in Table 2.

Feeding. Supplementary feed, containing about 19 % protein (Table 3), was given once daily in feeding trays (size, 120 x 180 cm), which were lowered down in ponds with the help of poles and rope to avoid feed wastage. The amount of feed was adjusted at 10 % of the mean body weight during the first month, 7 % during the second and later on 5 % till the harvesting.

Table 1
Physical characteristics of ponds used for *M. malcolmsonii* rearing

| Site | Pond number | Dimensions (m) | | Area (ha) | Water depth (m) range | Soil texture |
|--------------|-------------|----------------|------------|-----------|-----------------------|--------------|
| | | Mean length | Mean width | | | |
| Mirpur Sakro | 1 | 80 | 32 | 0.26 | 0.9-1.8 | Clay |
| | 2 | 80 | 32 | 0.26 | 0.9-1.8 | Clay |
| Chilya | 1 | 54 | 43 | 0.23 | 1.2-1.8 | Sandy |
| | 2 | 57 | 51 | 0.29 | 1.2-1.8 | Sandy |

Table 2
Stocking data for pond grow-out of *M. malcolmsonii*

| Site | Pond number | Date of stocking | Juvenile prawns stocked | Stocking density m ⁻² | Mean length (mm) | Mean weight (g) |
|--------------|-------------|------------------|-------------------------|----------------------------------|------------------|-----------------|
| Mirpur Sakro | 1 | 12.08.93 | 581 | 2.16 | 60 | 3.5 |
| | | 15.08.93 | 680 | | | |
| | | 16.08.93 | 932 | | | |
| | | 17.08.93 | 598 | | | |
| | | 20.08.93 | 766 | | | |
| | | 21.08.93 | 1028 | | | |
| | | 22.08.93 | 515 | | | |
| | | 27.08.93 | 510 | | | |
| | | <u>5610</u> | | | | |
| | 2 | 12.08.93 | 37 | 1.70 | 60 | 3.5 |
| | | 28.03.93 | 500 | | | |
| | | 29.08.93 | 412 | | | |
| | | 30.08.93 | 630 | | | |
| | | 31.08.93 | 719 | | | |
| 02.09.93 | | 400 | | | | |
| | <u>4423</u> | | | | | |
| Chilya | 1 | 20.10.93 | 1980 | 1.73 | 90 | 8.0 |
| | | 23.10.93 | 2000 | | | |
| | | | <u>3980</u> | | | |
| | 2 | 26.09.93 | 560 | 1.39 | 70 | 5.0 |
| | | 12.10.93 | 800 | | | |
| | | 13.10.93 | 730 | | | |
| | | 14.10.93 | 1050 | | | |
| | | 15.10.93 | 890 | | | |
| | | <u>4030</u> | | | | |

Table 3
Composition of supplementary feed used to rear *M. malcolmsonii* in ponds.

| S.no. | Ingredients | Composition (%) | Protein (%) | Fat (%) | Fibre (%) | Ash (%) |
|-------|--------------------------|-----------------|-------------|---------|-----------|---------|
| 1. | Rice bran | 50 | 5.45 | 3.41 | 7.55 | 5.10 |
| 2. | Mustard oil cake | 25 | 7.79 | 2.01 | 1.44 | 3.99 |
| 3. | Gram flour | 15 | 3.40 | 0.69 | 1.27 | 0.43 |
| 4. | Fish meal | 5 | 2.25 | 0.39 | 0.06 | 1.35 |
| 5. | Fish oil | 3 | -- | -- | -- | -- |
| 6. | Vitamins-minerals premix | 2 | -- | -- | -- | -- |
| | Total | 100 | 18.89 | 6.50 | 10.32 | 10.87 |

Water quality. Dissolved oxygen, temperature and pH were routinely monitored during the experimental period, (Table 4).

Sampling. Sampling was done monthly by seine, but met with some success due to vegetation in ponds. The sampled prawns were weighed, inspected and returned to the ponds.

Harvesting. Ponds were drained for harvesting. 100 prawns were randomly selected to obtain the final data. All these prawns were individually weighed, measured and sexed. Data is recorded in Table 5.

Table 4
Hydrological characteristics of ponds used to rear *M. malcolmsonii*

| Site | Pond number | Dissolved oxygen (mg l ⁻¹) | pH range | Water temperature range (°C) |
|--------------|-------------|--|----------|------------------------------|
| Mirpur Sakro | 1 | 9.0-10.6 | 7-8 | 17-35 |
| | 2 | 4.2-10.6 | 7-8 | 17-35 |
| Chilya | 1 | 8.4-11.4 | 7.0 | 17-36 |
| | 2 | 9.0-12.3 | 7.0 | 17-36 |

Results and Discussion

Maximum production (199 kg) was attained at the highest stocking density (2.16 m⁻²). Due to untimely payments of operational expenses, pond No.2 at Chilya had to be harvested before the expected time, so the production of this pond was lowest.

The prawns ranged from 125-210 mm (15.5-135 g) at Mirpur Sakro, while from 105-215 mm (12-150 g) at Chilya. Largest prawns recorded from ponds at Mirpur Sakro and Chilya were 210 mm (135 g) and 215 mm (150 g) respectively.

Edible portion of prawns was also calculated, medium sized prawns weighing up to 50g had about 50% edible portion, while it was less than 30% in prawns weighing more than 100g.

The male to female ratio was 1:8.75 in ponds at Mirpur Sakro and 1.8:1 in ponds at Chilya. Berried prawns were also present in the harvest, they were 20% and 80% in ponds at Mirpur Sakro, and Chilya respectively. The higher percentage at Chilya may be due to the late stocking in the ponds.

Feed conversion ratios (FCR) were high in all the ponds, ranging from 6.86:1 in pond No. 2 at Mirpur Sakro to 8.89:1 in pond No. 2 at Chilya. Highest FCR in pond at lowest stocking density was due to early harvesting of this pond. A production level of 599 kg ha⁻¹ was achieved in 223 days, during the present study.

It appears that maximum production can be attained by stocking juvenile prawns at high densities in such systems and temperature during culture period, the longer the growing period with optimum temperature, the better will be the production at harvest. Gopal Rao *et al* (1986) achieved an average production level of 628 kg ha⁻¹ with multiple harvesting in 390 days. Yaqoob (1994a) recorded an average production level of 563 kg ha⁻¹ in 196 days (pooled data of experiments conducted during 1989-90 and 1991). The production level was increased up to 599 kg ha⁻¹ in 223 days in the present study.

Gopal Rao *et al* (1986) reported survival of 51% during pond culture of *M. malcolmsonii*. Yaqoob (1994a) recorded survival upto 57%, while it was recorded highest (63%) during the present study.

Wide range in size of prawns was also noticed in the present study as observed by Gopal Rao *et al* (1986) and Yaqoob (1994a). Large prawns (150 g) recorded from pond No.1 at Chilya were due to large stocking size (8 g) in the pond. The

Table 5
Harvesting data for pond grow-out of *M. malcolmsonii*

| Site | Pond number | Date of harvesting | Days elapsed | Mean weight (g) | Survival (%) | Production (kg) | Production (kg ha ⁻¹) | FRC |
|---------------|-------------|--------------------|--------------|-----------------|--------------|-----------------|-----------------------------------|--------|
| Mirpur Sakro. | 1 | 23-04-94 | 251 | 55 | 64.53 | 199 | 765.38 | 7.11:1 |
| | 2 | 27-04-94 | 242 | 61 | 63.58 | 171 | 657.69 | 6.86:1 |
| Chilya | 1 | 30-06-94 | 253 | 63 | 68.69 | 173.5 | 754.35 | 8.29:1 |
| | 2 | 20-02-94 | 147 | 30 | 52.11 | 63 | 217.24 | 8.89:1 |

prawns having more weight possessed less edible portion while the ones having less weight had more edible portion.

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