Mass production of Penaeus monodon Fabricius juveniles in earthen nursery ponds

Apud, F.; Yap, W. & Gonzales, K.

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Specially constructed earthen nursery ponds capable of rearing very young postlarvae from the hatchery to a size and stage suitable for direct stocking in relatively ill-prepared ponds was conceived as the solution to the problem of low survival of hatchery fry. The nursery system used was composed of 16 units of 200 m^2 ponds and 16 units of 500 m^2 ponds provided with water supply and drainage canals (Figure 1). Reservoir pond (1 unit of 1,000 m^2 and 1 unit 600 m^2) with one unit portable pump was also provided and water for the 200 m^2 pond was filtered through a gravel filter and for 500 m^2 ponds through an everted 0.25 mm mesh nylon bagnet attached to the inlet pipe (Figure 2). To facilitate harvest the bottom of each pond was sloped towards a diagonal trench which in turn slopes towards a harvest/drain box at a rate of 1.5%.

Different culture techniques were tried one after another in order to obtain preliminary data on stocking density, water management, fertilization versus feeding and effect of different types of vertical substrates. Basically the runs were divided into two categories, low density (50/m^2) with minimum (tidal) water change and no supplemental feeding; and medium to high density (50-300 fry/m^2) with greater volume of water change (tidal but supplemented by pumping) and with supplemental feeding and/or fertilization of water column.

Mangrove tree branches and bamboo twigs set at one clump per 8-10 m^2 and dry coconut leaves set at one clump per 40-50 m^2 were used as vertical substrates. Chopped mussel meat was used as supplementary feed.

Penaeus monodon juveniles ranging from 0.4 to 1.5 g were produced in the ponds using hatchery bred fry. Survival rates of 93% and 43.6% were obtained after 29 days using P_{17} stocked at 15 fry/m^2 and P_4P_5 at 22 fry/m^2. Water change was effected mainly by tidal fluctuation supplemented by pumping only to maintain water depth during neap tides. No supplementary feed was used.

At 150 fry/m^2, average survival rate of 57.4% was attained after 25 days using P_4P_5 when vertical substrates were provided, water replaced at 5-10% daily by pumping and mussel meat fed at 100% body weight daily for the first 16 days and reduced to 20% for the rest of the rearing period. With the same treatment but with feeding abruptly stopped after 16 days, survival dropped down to 25.5% (Table 1).

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Table 1. Survival rates of prawn fry in earthen ponds at different densities using different postlarval stages and management techniques.

Density (No/m²)	PL stage	Duration (days)	Water change	Feed	Survival (%)
15	17	29	Tidal	None	93.0
22	4-5	29	Tidal	None	43.6
150	4-5	25	Tidal & pump	a	57.4
150	4-5	25	Tidal & pump	b	25.5

a Mussel meat at 100% body weight daily for 16 days and 20% subsequently
b Mussel meat at 100% body weight daily for 16 days and stopped

A comparison was also made on the effect on survival of feeding, fertilization of water column and combination of both at medium to high density stocking using tidal fluctuation to change the water. Results are shown in Table 2. The juveniles when harvested ranged from 0.36 to 1.5 g with size depending upon stocking and management technqiues. Generally the size at harvest was inversely proportional to survival.

Table 2. Survival rates of *P. monodon* fry in earthen nursery ponds using different feeding techniques after 25 days.

Treatment	Pond size (m²)	Density (no/m²)	Survival (%)	Average weight (g)
A	500	100	1.13	1.5
	200	50	29.80	0.76
B	500	100	10.50	0.36
	200	50	21.90	1.06
C	500	100	4.80	0.62
	200	50	19.80	0.84
D	500	100	26.76	0.61
	200	50	25.60	1.05

A Fed with chopped mussel at 20% body weight twice daily
B Fertilized with 18-46-0 at 25 kg every two weeks
C Treatments A and B combined
D Control – no feeding and fertilization

The results of the first experiment reaffirms what is already known in other penaeid species, namely, older fry has greater chances of survival. However, with improved management techniques it was also seen that young postlarvae can be reared in high densities in earthen nursery ponds with acceptable survival rates.

The results of the various runs also show that the traditional nursery pond designs and practices used for milkfish in the Philippines is applicable to prawn only at very low densities and gives acceptable high survival rates only when used with the older postlarval stages which means use of wild fry. The results also points out the necessity of providing supplemental feed.

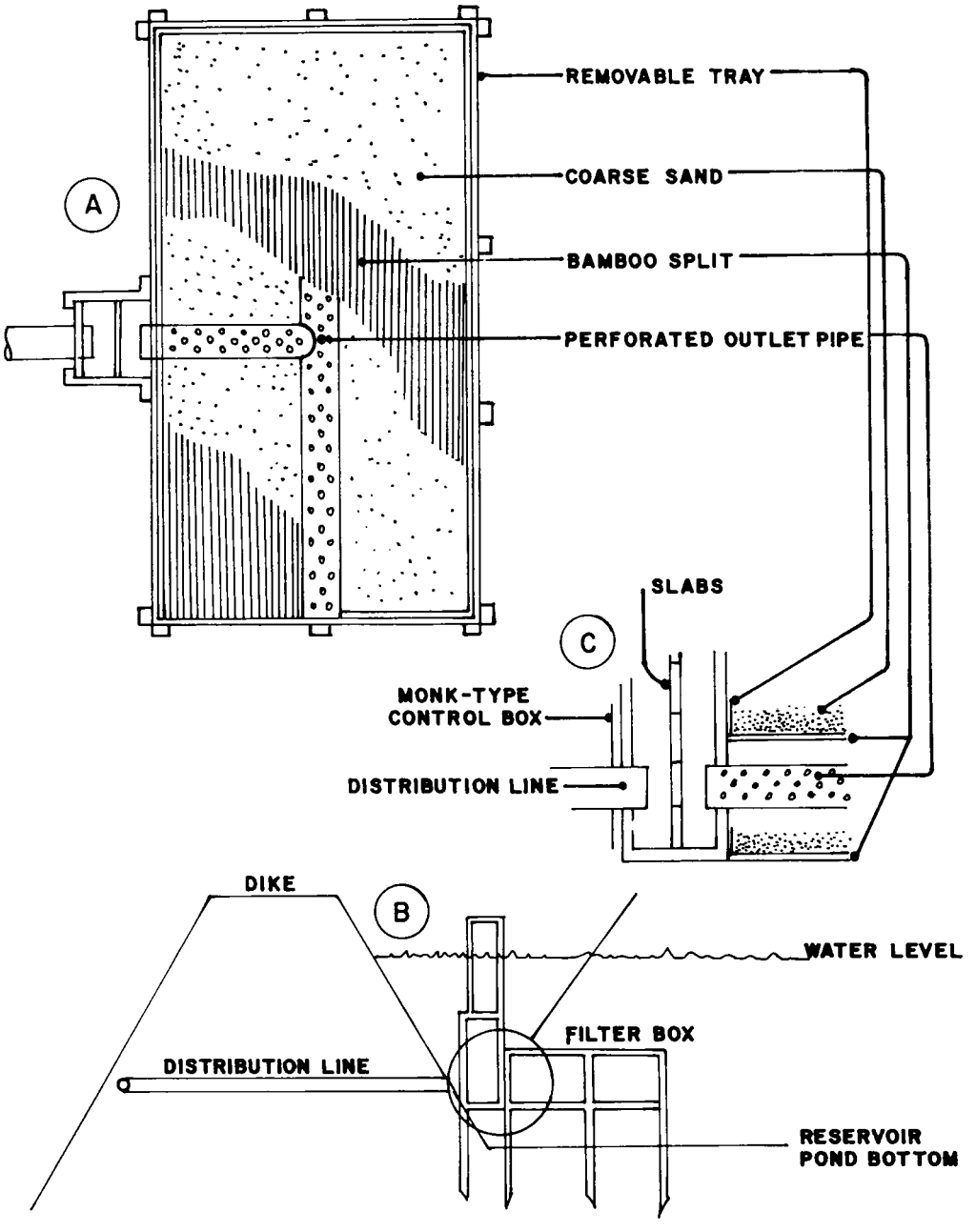
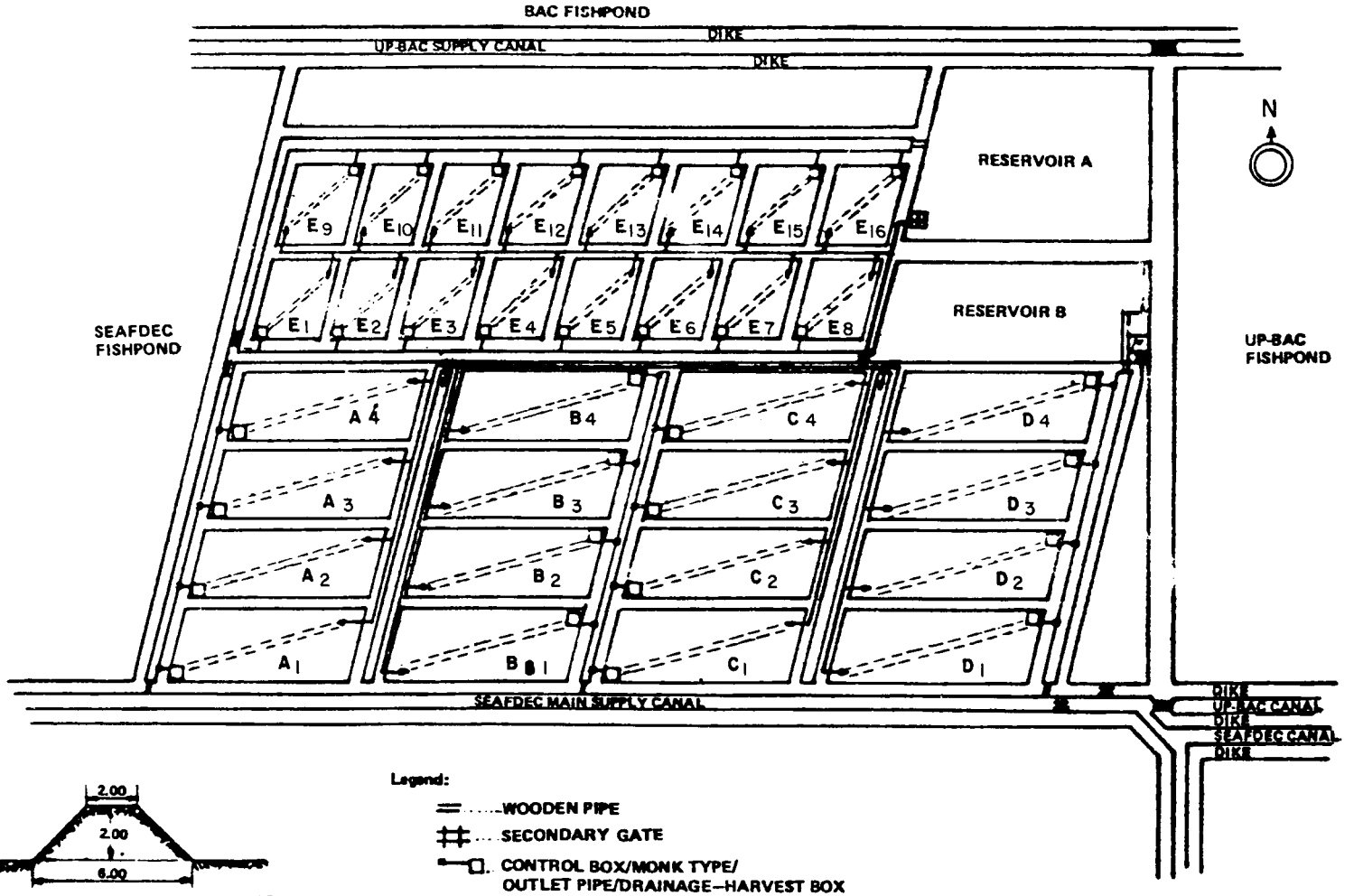
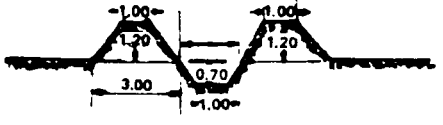


Fig. 2. Diagram showing filtration box in reservoir pond.
A - Top view showing layers of coarse sand, and bamboo splits,
B - side view of filter box in reservoir pond,
C - Inset showing the details inside filter box and drain control box .



CROSS SECTION OF RESERVOIR DIKES



CROSS SECTION OF CANAL AND DIKES

Legend:

- WOODEN PIPE
- SECONDARY GATE
- CONTROL BOX/MONK TYPE/ OUTLET PIPE/DRAINAGE–HARVEST BOX
- INLET SPRINKLER
- PUMP HOUSE
- FILTER BOX
- BOTTOM TRENCH

Scale 1:1000 M.

FIG. 1. A-1 ha nursery pond system in a diamond-shaped design

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