CENAIM Study Examines Effects of Transport on Shrimp Postlarvae Survival

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Floating cages were placed in a shrimp pond for testing under field conditions.

The cumulative effects of hatchery harvest, packing, temperature change, transporting, and acclimation prior to stocking exert stress on shrimp postlarvae. Appropriate techniques for penaeid shrimp seedstock transport and acclimation are therefore important to ensure maximum survival in nursery and growout ponds.

Few relevant, comparative studies on the subjects are available. At the National Aquaculture and Marine Research Center (CENAIM) in Guayaquil, Ecuador, several experiments supported by the Council of Flemish Universities were conducted to evaluate the effects of transportation factors on the survival of *Litopenaeus vannamei* PL after acclimation.

Experiment 1

Experiment 1 incorporated three PL densities (125, 250, and 500 PL/l) and three transporting times (three, six, and nine hours) following a 3 x 3 treatment design with 4 replicates/treatment. PL_{25} were randomly allocated at about 95-105 PL/g in 1-l, airtight plastic bags with saturated oxygen. PL survival was estimated after each transporting time by counting all the larvae in the treatments bags. The water in the transporting bags registered temperatures of 27-28° C and salinity of 34.5 g/l.

Experiment 2

Experiment 2 used densities of 250, 500, and 750 PL/l, and transporting times of three, six, and nine hours. Shrimp were transported in two types of containers: 20-l buckets with aeration and 20-l airtight plastic bags with saturated oxygen. The operational volume in each container was 15 l. Water temperature in the transporting units was reduced to 22-23° C with ice packs.

Acclimation

After transport, postlarvae were acclimated to pond water conditions and stocked in 0.4 x 0.4 x 0.4-m floating cages fixed inside a commercial shrimp pond, or acclimated and seeded in 50-l glass aquariums at CENAIM. PL were acclimated to the 41 g/l pond water salinity at a rate of 2 g/l/hour. The shrimp stocked in the glass aquariums required only temperature acclimation.

Survival for each treatment combination was evaluated after four days by counting the live PL remaining in the floating cages or aquariums. Water temperatures in the ponds and aquariums ranged 24-26° C. PL were fed microparticulate feed in 6 rations/day. Water exchange in the aquariums was set to 30%/day.

Results

Significant ($P < 0.05$) differences in PL_{25} survival were measured for density and transport time in experiment 1. The best significant survivals were observed at the lowest density and shortest transport time (Table 1).

In experiment 2, no significant differences in survival were found after four days of holding for PL density, type of container, and transporting time in either floating cages or aquariums.

Acclimation to 41 g/l salinity pond water had no effect on PL survival. Although not statistically significant, the postlarvae acclimated to pond water showed slightly higher survival (overall average 76.3%) than the aquarium PL (average 71.9%).

Table 1. PL survival after transport at three densities. Values with different letters statistically different (P < 0.05).

Time (hours)	Density (PL/l) 125	250	500	Average
3	99.2	99.4	95.4	97.1[a]
6	92.9	99.3	88.2	98.1[a]
9	99.2	95.8	87.1	90.2[b]
Average	98.0[a]	93.5[b]	94.0[b]	