

ACCELERATED SEED PRODUCTION OF PEARL SPOT USING MODIFIED HATCHERY METHOD

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Introduction

Pearl spot (*Eetroplus suratensis*), popularly known in Malayalam as karimeen is an indigenous fish extensively found along the east and south-west coasts of Peninsular India (Jhingran and Natarajan, 1969,1973). Pearl spot is popular in Kerala for its taste and appearance. It is an elegant and exotic dish during the festivals of all occasions in Kerala. It is also inevitable in the non-vegetarian dishes of both foreign and native tourists in the house boats and resorts located along the coastal line of Kerala. Hence Pearl spot is an essential component contributing towards the sustainability of tourism (particularly back water tourism) industry in Kerala. In Kerala government declared Pearl spot as "State Fish of Kerala" and celebrated the year 2010-2011 as the "The Year of karimeen" for creating awareness about the need of Pearl spot conservation and its commercial production potential in the State. The annual landings of *E. suratensis* in the riverine zones of the lake, which constitute approximately 50 percent of the lake expanse has been reduced to 200t during 1999-2000

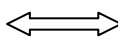
(Padmakumar et al., 2002) as compared to 1252 t reported during 1960s (Samuel, 1969). The consistent demand and price value motivated the farmers to initiate Pearl spot culture using wild caught seeds in different parts of the state. At present, the seeds (fry's/fingerlings) required for culture in backyard ponds, tanks, artisanal cages etc. are collected from the wild. The annual production of 2,000 MT is found to be insufficient to meet the ever increasing demands for "Kerala karimeen" in the country. It is estimated that annual production of 10,000 MT would be required to meet the present requirement. Pearl spot retail sale price ranges from Rs.250-350/- per kilogram in the domestic market.

Natural recruitment of the Pearl spot is adversely affected by the active and passive interventions by the humans in the ecosystem. Active interventions includes reclamation of natural water resources, sand mining, indiscriminate dredging for sub soil lime shell deposits, unscientific fishing practices, pollution, etc., This paved the way for the natural standing stock depletion of Pearl spot and price rise. In this context farmers initiated high density farming of pearl spots in cage systems and ponds. This has forced the local fisher folks for large scale collection of Pearl spot fry's and fingerlings from its natural breeding grounds to meet the ever increasing demand for its brackish water culture. Over exploitation through collection of indigenous Pearl spot fry's from wild resulted in the depletion of standing stock in recent times. Hence there is enormous potential for the production and supply of the Pearl spot seeds in the country. Institutions having skill and experience in imparting training on Pearl spot production technology are few in number in the State. It is estimated that per year requirement of Pearl spot seeds in Kerala is as high as 40 million, whereas the present availability is only 8 million. In this backdrop, Krishi Vigyan Kendra (Ernakulam) of CMFRI initiated mass scale Pearl seed production programme through modified hatchery method.

Pearl spot seed production scenario

Wild caught seeds are the widely marketed in the seed industry than the hatchery produced seeds and used for the culture. Recently efforts for promotion of seed production are getting virtuous momentum in the State. Pearl spot seed production is practiced mainly by two methods viz., traditional farmers practice and modified hatchery method. The major differences between these two methods are as follows.

Table:

| Traditional seed production |  | Modified Hatchery method |
|------------------------------------|---|---------------------------------|
| Not required | Scientific knowledge | Required |
| Pond | Infrastructure | Pond and indoor facility |
| Less | Operational Cost | High |
| Not required | Live feed facility | Required |
| Normal | Survival Percentage | High |
| Less | Labour input | High |
| Low | Production | High |
| Difficult | Harvesting | Easy |
| Not required | Feed | Required |

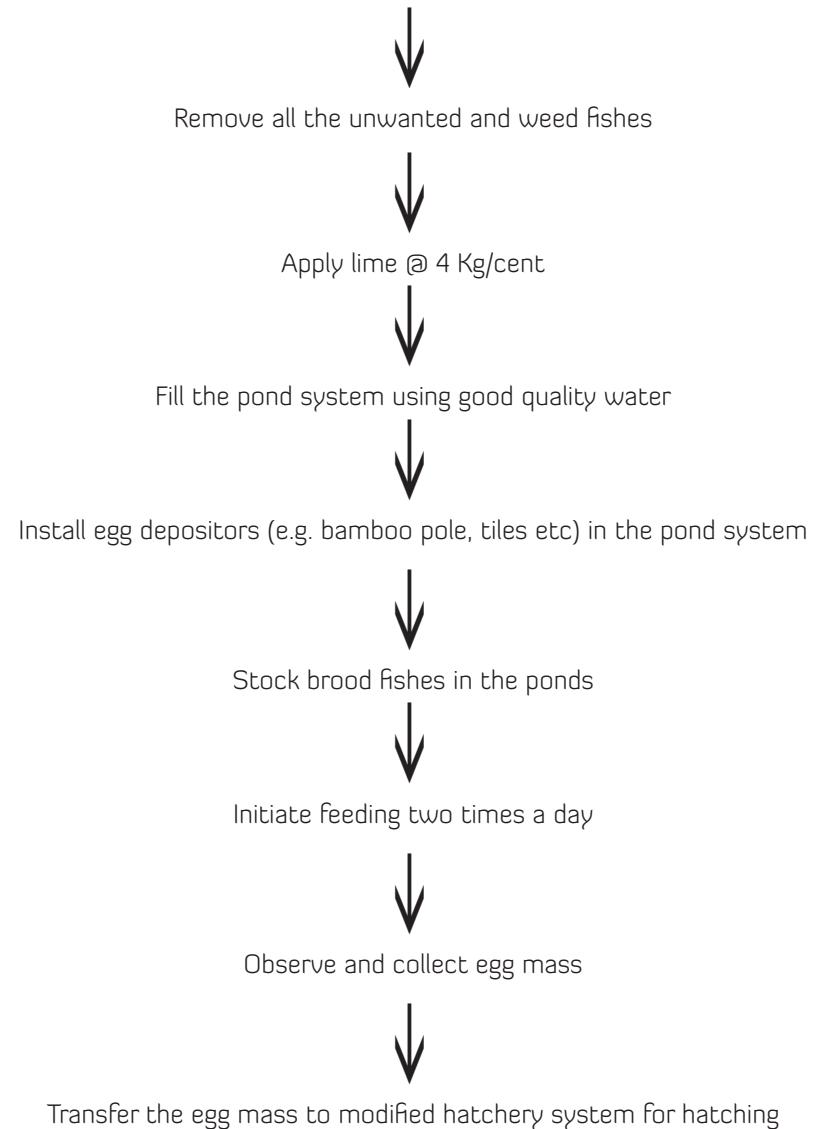
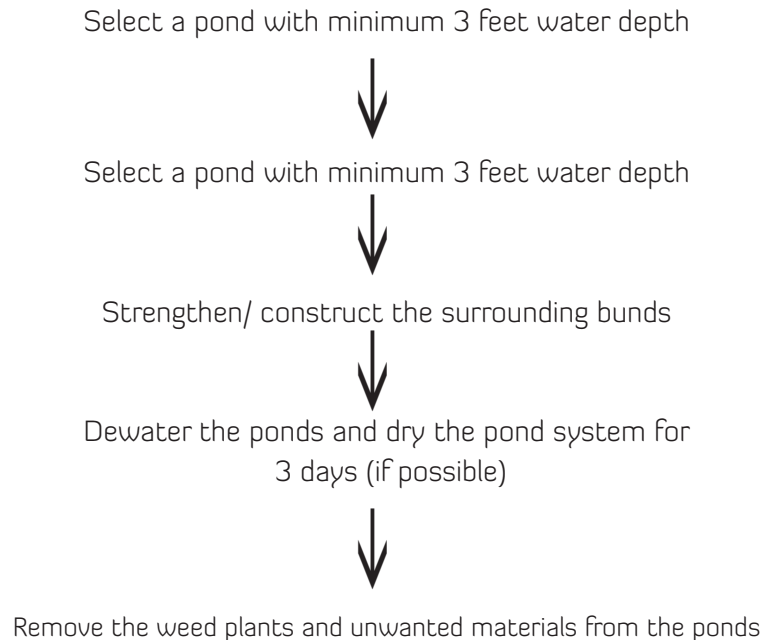
2. Modified hatchery method for Seed Production

2.1 Brood stock pond preparation

Pearl spots are year round breeders but it breeds profusely during February to May and October to December periods. Visual differentiation of sex status during the juvenile stage is difficult in Pearl spot. But the sexes can be identified in matured adults, especially during the breeding period. Pearl spot produce eggs easily in natural pond conditions than in the artificial structures. Hence a well prepared pond is essential for facilitating egg production.

Small sized ponds are ideal for community breeding of pearl spots. Its size can vary from few cents to acre but preferably should be below 60 cents. The selected pond should possess well-built bunds and a suitable water exchange system. In ponds with tidal inflow sluice gates can regulate water intake while in the case of pump fed ponds a pumping system should be installed prior to stocking. Proper cleaning, desilting and weeding are required to facilitate egg laying process in a pond system. Weed fishes are the major menace in Pearl spot seed production ponds. Hence utmost should be taken to remove all the unwanted fishes from the breeding ponds. Weed fishes not only eat the eggs but also paved the way to reduce the hatching percentage. Complete drying of the ponds for few days till crack formation in the bottom is the worthy practice to reduce the weed fish problem than the other existing practices such as application of fish poisons, chemicals, etc.,

The flow chart of the pond preparation works is



Lime application

Lime application is an essential practice to adjust the pH of the pond in the Pearl spot seed production ponds. Quantity of lime required for the pond will vary depending on the pH of the pond. Hence prior to initiate the lime application process pH of the pond need to be checked using tools such as pH pen or pH solution or pH paper.

Egg depositors

In general, Pearl spots attach eggs in hard substrates present in the brood stock ponds. Naturally they prefer bamboo poles, mud tiles, coconut husk and shell, submerged plants, submerged wood, rocks, stones, coconut leaves and other hard surface materials for depositing the eggs. Experiments using different egg depositors in ponds revealed that the bamboo poles and mud tiles are good egg depositing structures than the others. Hence to facilitate egg depositing bamboo poles or mud tiles with 1 to 1.5 m gap has to be fixed in the margins of the ponds prior to brood fish stocking.

Stocking of brood fishes

Pearlspot, *E. suratensis* is heterosexual and is gonochoristic exhibiting external fertilization. Fish is monogamous and identification of sexes is possible only during the breeding season. Pearl spot males attain sexual maturity at 125 – 140mm length and 80 – 100 gm size while females attain at 110 – 120 mm length and 75 – 90 gm size. Body coloration and iridescence of the matured males become more intense close to the spawning season. Females are generally small when compared to males of the same age. Females genital papillae become larger, broader, reddish, swollen and appear modified into an ovipositor close to breeding season Bindu et al., 2006. Fecundity in pearl spots varies individually depending on the size and condition of the brood fishes. In normal conditions its fecundity varies from 874- 7554 (2748) numbers. Healthy brood fishes either collected from wild or grown in ponds can be used as brood fishes for the breeding programme. Optimum stocking density of adult fishes in breeding

ponds ranges from 5 to 10 numbers per cent area of the pond.

Feeding

Supplementary feeding is essential for attaining maturation and initiating breeding of Pearl spots in the pond systems. Formulated floating feeds or farm made feeds can be used as the feed. Feeding should be carried out two times a day preferably during dawn and dusk.

Egg mass collection and hatching

Matured pearl spot start laying eggs after one to two months of stocking in the brood stock development ponds. Pearl spot prefer egg depositors sited near the margins of the ponds for laying the eggs hence its egg mass siting is a comparatively easier procedure in the ponds. Naturally, egg masses are protecting by the parents from other predatory fishes. These egg masses are the base material for the hatchery rearing works. The egg mass transporting is a vital process in the seed production phase. Special care should take to avoid exposure to air while transferring the egg mass from pond to hatching tanks. One egg mass or multiple egg masses sited on the same day can incubate in similar tanks for hatching. Preferable size of the hatching tank is 1 tonne with minimum 2.5 feet water depth. To replicate the fanning process of parent's in nature continuous aeration has to be provided in the hatching tanks. Any failure in aeration may reduce the hatching percentage of eggs in the tanks. Three to four days incubation is required to initiate the hatching process in the Pearl spots. Freshly hatched fry's lay as round groups in the tank bottom. Larvae reabsorb the yolk sac for the initial developmental process. Hence no feeding is requires for the freshly hatched larvae until free exhaustion of yolk. Generally this process will take two to three days period.

Larval feeding

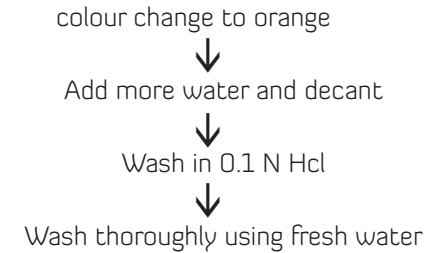
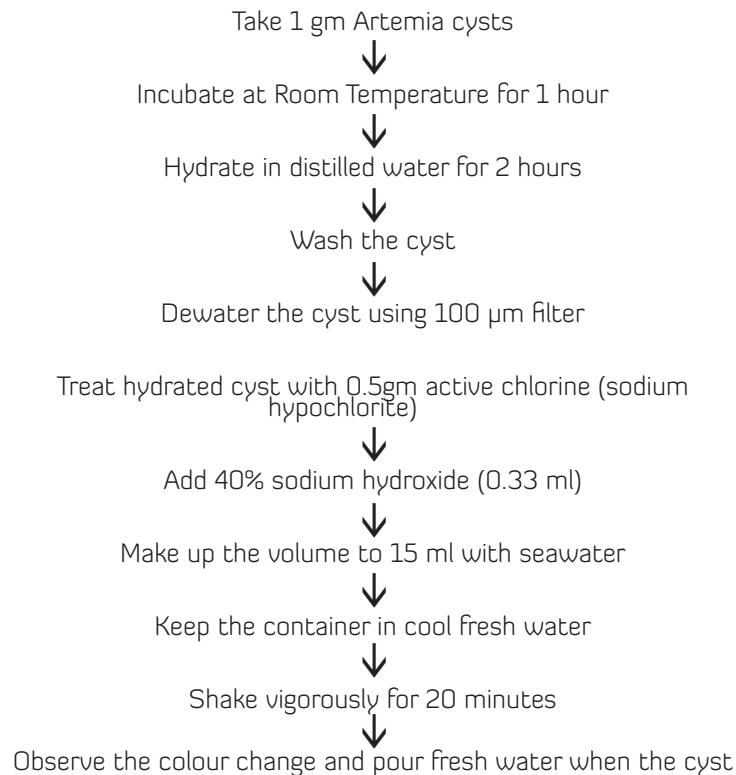
Feeding can initiate after two to three days of hatching depending on the initial growth of larvae. Readiness of feed acceptance by the larvae can understand from its swimming

behavior. *Artemia* nauplii are the best choice for starter diet in the tanks.

Live feed: Artemia

Artemia are available in cyst form in packaged air tight containers mainly imported from USA or China. These cysts need 24 hour incubation in saline condition to hatch out to nauplii which is the required form of feed for predatory larvae. Freshly hatched nauplii possess all the essential PUFAs (Vikas et al., 2012a). Keeping long time without harvesting from the hatching tanks may reduce the nutritional quality as well as will increase its length. Hence feeding using freshly hatched nauplii give good results (Vikas et al., 2012b).

Decapsulation and hatching Procedure of *Artemia* cysts are as follows.



Decapsulated cysts filter and wash thoroughly using fresh water to remove all traces of hypochlorite. Incubate the decapsulated cyst (25 1.5oC) in seawater (35 ppt) under florescent light (1500 lux) for hatching.

Harvest the nauplii after 12 hours of incubation

Formulated diet

In place of *Artemia* nauplii dry formulated larvae diet also can be used for the freshly hatched larvae. In such case feed size should be preferably below 300 micron. As per the growth of the larvae feed size also has to be increased. Readily available formulated larvae feed size are 500 micron, 700 micron and 1mm. One and half months rearing is required to reach the larvae to fry stage (1.5 cm).

Nursery rearing

Nursery rearing is the process generally carries out to rear the fry to cultivable fingerling size (7 to 8cm). Nursery rearing can conduct both in open nursery ponds and in netlon happa systems. Nursery rearing in ponds: A well prepared pond is desirable to initiate nursery rearing in pond systems. Pond preparation includes the process such as dewatering, pond drying, weed fish removal, liming, etc., Stocking density of the fry's in the ponds may vary with the water quality parameters. Ideal stocking density in well prepared pond is ranges from 600 to 800 per cent area. Spot feeding till satiation is advised to carry five times a day in nursery rearing ponds.

Nursery rearing in Happa nets: Happa /encircled nets are widely used for nursery rearing of Pearl spot. Happa nets are fabricated using synthetic fabric of velon screen material. Stocking density vary depending on the size of fry, stocking density, water quality, depth of the pond, etc.. Square shape happas are more convenient for handling when compared to round shape happas for Pearl spots. Ideal size of a happa net for nursery rearing in shallow ponds is 1.2m X 1.2m X 1.2 m size.

Advantages of happa nets in nursery rearing

- Controlled feeding can carry out which in turn reduce feed wastage
- Harvesting can be done easily without any injury to the frys
- Survival percentage will be high
- Management and monitoring will be easy in happa nets

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