

Non-invasive induced breeding of *Clarias magur*

Promising technology with compassion

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Catfishes, belonging to the family of Siluridae, Clariidae and Ictaluridae, have great aquaculture significance across the globe. One of the major hurdles, realised in catfish propagation, was the requirement of artificial fertilisation of eggs using sperm suspension from testis of the killed male. In the absence of achieving voluntary spawning and poor strippability in male catfish, male are sacrificed to collect testis for fertilising eggs and seed production of catfish. Across the globe, this process is being followed for several catfish species belonging to the family of Siluridae, Clariidae and Ictaluridae. This process is not only cumbersome but also inflicts loss of valued brooder and adversely affects implementation of genetic improvement programmes. Several efforts have been made to avoid this cumbersome process. In *Clarias magur*, a high value Asian catfish, we demonstrated that hormonal manipulation promotes sustained gonadal maturation in males, and induces mating and voluntary spawning with high fertilisation and hatching rate.

Keywords: Aquaculture, BRICS technology, Catfish, Oxytocin

Present process and status of *Clarias magur* seed production

Pituitary gland extract (PGE) and LinPe method-based GnRH formulations (Salmon gonadotropin releasing hormone analogue/s GnRhA and a dopamine antagonist) have been very successful in inducing captive spawning and hatchery operation of carp but produced limited success in catfish species. In catfish, major barrier was releasing of sperms from male partner, since these hormonal treatments bring final gonadal maturation and free oozing of eggs in female. PGE and GnRH formulations inject while bringing some positive changes in gonad of male catfishes,

do not induce behavioural responses required for mating and voluntary spawning in captivity. This has been a key obstacle and seed production has been facilitated by artificial fertilisation of stripped eggs, using sperm suspension from testis, obtained after sacrificing males. This technology evolved in the late 1980's and still follow world-wide for several catfish species including *Clarias*

magur. In terms of economics, this does not appear to be a major issue, limitations imposed on genetic improvement programmes and poor adaptability by farmers due to cumbersome nature of the technology, are amongst the few factors that do not allow harnessing the full potential of the species for aquaculture despite the fact that the fish has a high value. The procedure

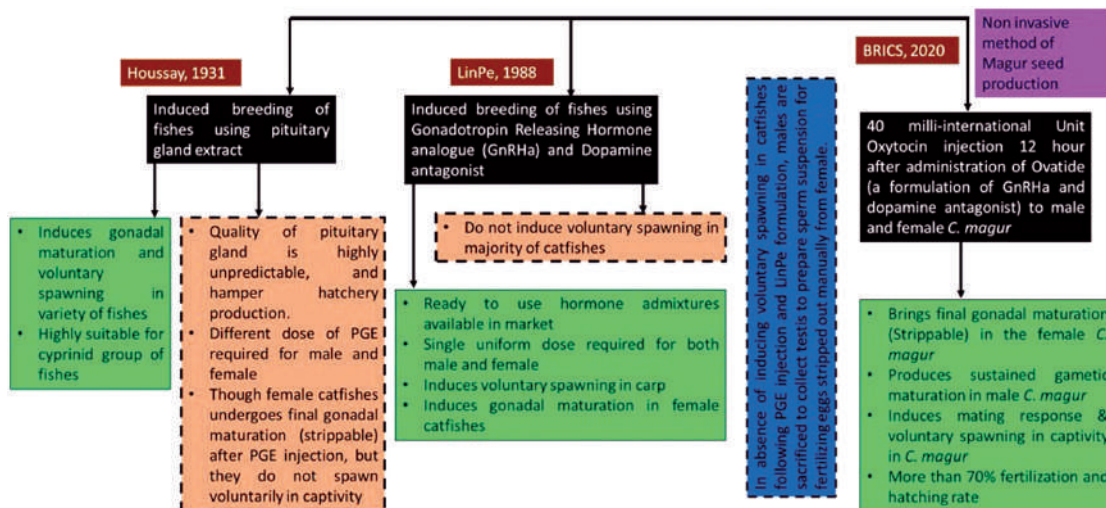


Fig. 1. Chronological progress in the field of induced breeding of fishes



Fig. 2. Spawning facility

undoubtedly results in extreme suffering to the animals and alternatives to this procedure has been a matter of active research internationally for the last 50 years (Fig. 1). To overcome this reproductive dysfunction and understand associated molecular underplay, substantial efforts comprising hormonal augmentation to transcriptome analysis has been made across the globe with special emphasis on male catfish.

BRICS Technology

College of Fisheries, Tripura developed BRICS (Barrier Removal in Catfish for Voluntary Captive Spawning) technology to address this obstacle. This is the first report about the voluntary breeding of Magur in captivity through hormonal manipulation. The BRICS technology relies on the augmentation of "Oxytocin" in "Ovatide (a commercial inducing agent)" injected brooder. Briefly, during breeding season (May-August) healthy mature male and female brooders of weight ranging 100-180 gm are selected for breeding purpose. Firstly, they are injected with Ovatide at a dose of 0.5 ml per kg body weight and placed together in spawning facility with gentle water flow of 0.3 lit per minute. Polystyrene box, plastic tub or FRP tank of various sizes (area 0.15-1 M², water height 10-15

cm) with lid, can be used as spawning tank (Fig. 2). After 12 h of ovatide injection, both male and female are given injection of oxytocin at a dose of 40 milli-International units per kg body weight and placed back into a spawning facility. After 16-18 h of Ovatide injection, the brood pairs start mating and voluntary spawning commences, which continue for the next 3-4 h. This method ensures voluntary spawning in more than 80% of breeding pair with 2,000-3,000 eggs from 100-150 g female brooder (Fig. 3). Generally, fertilization rate and hatching rate of the spawned eggs in



Fig. 3. Voluntary spawning of *C. magur* in captivity using BRICS technology. Black arrow shows spawned eggs.

the breeding trials are about 80% and 70%, respectively. After 24 h, both male and female are removed and spawned eggs are allowed to remain in spawning facility for incubation purpose with slow water flow. Depending on water temperature, hatching occurs between 24-30 h. After that hatchlings are shifted to the nursery tank for rearing.

Spawning facility

Simple containers such as polystyrene box, FRP tank or plastic tub with lid can be used as spawning facilities. slow water current of 0.3-0.5 lit/minute is provided to ensure aeration and thereby high/survival of the spawned eggs (black arrow) and hatchlings; Spawned eggs can be incubated within the spawning tank for hatching, and the hatchlings are gently siphoned out after yolk sac absorption is completed for nursery rearing.

Prospects of BRICS technology for catfish aquaculture

The technology developed will have a far-reaching impact on aquaculture sector in general and catfish seed production in particular, by helping the augmentation of farmers' income through catfish seed production. This will play crucial role in boosting the socio-economic conditions of the resource poor farmers and will make them *Atma Nirbhar*. This technology will enable to utilize millions hectares of oxygen-deficient water bodies of aquaculture, such as weed choked ponds, marshy areas and paddy fields through culture of air-breathing catfishes not only in India but in Asia as a whole. The technology will also assist in conservation of several fish of conservation significance as well as in genetic improvement programs by enabling preservation of male brooders of high genetic merit.

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