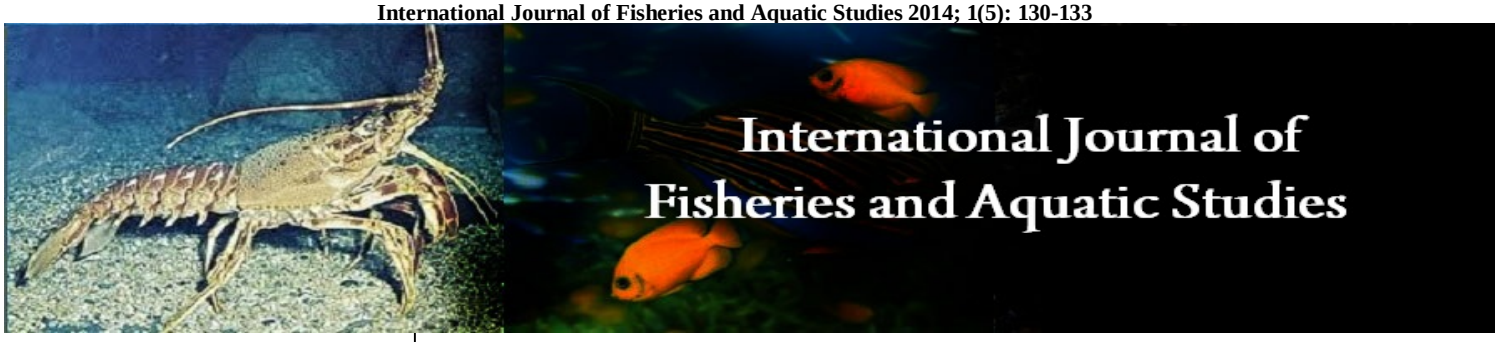

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Preliminary observation on the induced breeding and hatchery rearing of an endangered catfish, *Horabagrus brachysoma* (Gunther)

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ABSTRACT
Induced breeding and seed rearing of an endangered bagrid catfish, *Horabagrus brachysoma* were conducted. The female brood responded to stripping either in single or double dose of ovaprim at 0.8-1.5 ml/kg body weight at 13-20 h latency period. The stripped egg weight varied between 14-20 g and the fecundity of the catfish ranged 1.6-1.8 lakhs/kg body weight indicating it as a high fecund catfish. The fertilization and hatching of the eggs were observed to be 50-81 and 27-68% respectively during different trials. The hatchlings were 1.28 mg in weight and 5 mm in length. The larvae accepted well to live plankton and performed well, resulting in a survival rate of 64-76%. The fry also performed well at two density levels (50 and 100/m^2) resulting over 90% survival during fingerling production.

Keywords: *Horabagrus brachysoma*, Fertilization, Hatching, Growth, Survival.

1. Introduction
Catfishes have a great demand among the consumers of Indian sub-continent. The demand leads to over exploitation of catfish varieties from the natural water bodies. *Horabagrus brachysoma*, an endemic bagrid [3, 8] is under threat. It is popularly known as Asian sun catfish or yellow catfish. Its elegant yellowish look with two black patches just beyond the operculum in both sides of the head enhances its market value as an ornamental fish. Its ornamental value in the international market as well as its food value in domestic market has been documented [10, 1]. Its gradual depletion from its habitat enlists it as an endangered species [9]. The aquaculture potentiality of this catfish has been discussed and advocated it as a candidate species for aquaculture [14, 1]. But the paucity of literature is felt on its captive breeding and rearing except few biology studies [6, 7, 14]. Hence the present article communicates the captive breeding and rearing possibilities in captivity, and growth performance of this catfish in hatchery condition.

2. Materials and methods
The juveniles of *H. brachysoma* were collected from its natural habitat and transported to the Institute. They were reared in cement tank for two years to get matured brood. The cement tank was provided with 2-3 cm soil at the bottom and 45-60 cm water depth was maintained. The tank was provided with pipes for the hiding of fishes as they also take shelter in the crevices of the natural water bodies. Fishes were fed daily with pelleted feed with 30% protein. The broods raised in cement tank were collected during the month of July for induced breeding. The females of 60-90 g and males of 60-100 g weight range were considered for breeding operation. The female brood was selected by seeing the bulging of abdomen and uniform intra-ovarian oocytes. Free oozing males were identified as perspective male.

The suitable male and female broods for breeding operation were kept separated in the fiberglass tank in the hatchery. A water height of 10-15 cm was maintained in the tanks and was provided with continuous aeration to avoid oxygen depletion. Ovaprim, a mixture of sGnRHa and domperidone was used as an inducing agent. The females were tried with three different doses of ovaprim (0.8-1.5 ml/kg body weight) in 1-2 split doses with a maximum interval of 12 h. The females were regularly checked at an interval of 3-4 h to observe the free flow of eggs after the second injection. The males did not require any hormone injection.

After seeing the free flow of eggs, the females were stripped and eggs were collected in a tray

made up of tin foil. The weight of stripped egg was recorded to know the total weight of stripped egg from a female brood. A small sample of egg was collected and weighed. The eggs were counted to know the fecundity of the female. The rest of the eggs were transferred to the plastic tray and the milt from the male was stripped directly on the egg for fertilization. The eggs were washed thoroughly to get rid from extra milt and ovarian fluid if any. The fertilized eggs were released into the incubation tray for hatching. The percent fertilization was determined by visual observation of the embryonic eye in the egg and opaque eggs were considered unfertilized. The percent fertilization was calculated by visual observation of the number of fertilized eggs in three sub-samples of incubated eggs. The Average value was considered as percent fertilization for a female fish. The hatching percent was also calculated in a similar way like percent fertilization.

The hatchlings were washed properly to make them free from eggshell and unhatched eggs. The initial length and weight of hatchlings was recorded. The initial average length and weight of larvae were 5.08 mm and 1.28 mg respectively. A total of two trials, was made using fiber glass tanks having 0.39 m^2 area for larval rearing with a stocking density of 800 larvae/tank. The larvae were regularly fed with live plankton after yolk sac absorption (4^{th} day) till the end of sixty days of rearing. The tanks were cleaned thrice daily by replenishing two-third volume of water. The final length and weight of fry were recorded through a standard measuring board and electronic balance respectively. The SGR, percent weight gain and survival rate were calculated as {(In final weight-In initial weight)/Days of the experiment} x 100 and {(Final weight-Initial weight)/Initial weight} x 100 and (Number of larvae stocked - Number of dead larvae) / Number of larvae stocked X 100, respectively. The water quality parameters were analysed weekly once by the standard method [2].

Thus the fry produced were utilized for the fingerling raising programme. The bottom of four ferro cement tanks (4 m^2) was spread with 2-3 cm soil and 30-40 cm water depth was maintained. The tanks were manured like carp nursery ponds before 7 days of stock and inoculated with live plankton. Duplicate tanks were stocked @ 50 and 100 fry/m^2, and were reared for a 30 days period. The initial length was recorded through a standard fish measuring board and the weight was recorded through an electronic balance with animal weighing facility. The average length and weight of fry during stocking were 30.4±0.78 and 278.9 ±18.48 mg respectively. The fish were fed with compound feed in dough form till satiation [5]. Three fourth water volume was replenished at 15 days interval from all the rearing tanks to provide a better water environment. At the end of the rearing period, final length and weight, SGR, percent weight gain, and survival rate were recorded as done for the larval rearing trials. The water quality parameters were analysed weekly once by the standard method [2].

3. Results and discussion

The *H. brachysoma* broodstock raised in captive condition can be used for successful induced breeding by use of external hormone injection like other fish. The dose level of ovaprim (1 ml/kg body weight) used for successful carp breeding is adopted as the baseline dose for the breeding attempt. Hence a dose level of 0.5 ml ovaprim/kg body weight was tried during the initial trial. The swelling as the well as the softness of the abdomen was clearly visible after first injection, but the females did not attain strippable condition in all three trials except once. Hence second dose was administrated during three occasions (Table 1). All the females responded fully or partially at 0.8-1.5 ml dose levels with variable stripping time. This fluctuation of hormone dose and latency period might be due to variability of maturity status between the females, which was also reported elsewhere for other species [4]. The swelling and softness of abdomen of females were better while using 1ml ovaprim per kg body weight as the first injection resulting higher egg output. Hence this dose may be considered as a suitable dose for this catfish. The breeding response in terms of stripped egg weight was higher in 90g female compared to 60 g female, while injecting 1 ml dose. In separate studies, the superiority of spawning performance of larger fish compared to smaller individuals has also been documented [11, 15]. The eggs stripped from each individual were calculated to 1.6-1.8 lakhs/kg body weight during captive breeding operation. This indicates this fish as a high fecund fish, as also documented earlier [7]. The percent hatching of eggs in three trials were low (26-48%) compared to 68% in one occasion, where the latency periods were17-20 h and 13h respectively. The lower hatching of eggs has also been documented in *Clarias batrachus*, while exposing the ovulated eggs to longer latency period [13]. The hatching time varies from 20-22 h at a water temperature ranging between 27-28 ºC during the entire experimental period. This minute change of temperature perhaps did not influence much on the hatching time. So the nominal change in the hatching period of 1-2 h was observed.

The water quality parameters of larval and fingerling rearing tanks were presented in Table 2. There was not much variations of water quality parameters in the larval and fingerling tanks during the rearing period. This might be due to regular cleaning and water exchange of the rearing tanks and the parameters are within the permissible range as observed during rearing of other catfish [12].

The yolk sac got absorbed at the age of three days and the larvae showed feeble tail lashing movement within this period. They became active after this age and accepted live plankton as feed. There was a minor difference in final average length of the fry in both the trials, which were only 2 mm (Table 3). But the difference between final average weights of fry in both the trials was 71 mg. The lower weight of 243 mg in trial-1 was due to higher survival rate. There might be the possibility of crowding as well as competition for food among the larvae, which becomes the limiting factor for the growth. It has also been reported that the feed intake of tilapia is highly influenced at higher stocking density [17]. The lower survival rate of 64% was observed in trial-2 compared to 74% in trial-1. The stress during counting the larvae could be the probable cause of initial mortality at third and fourth day after stocking. The mortality due to stress has been reported in many fishes [16].

There was not much variation observed at final length, but a great difference was observed in final weight between the two densities (Table 4). The growth of fingerlings in higher density was low compared with lower density. The fingerlings achieved the average weight of 832 mg in lower density compared to 611 mg in high density tanks. This increase of growth in the tanks was due to more living space for the fish in

lower density, which is similar to the observation during rearing of other catfish [11]. The survival rate between the two densities did not vary much (6.88%). The higher biomass of the harvested fingerlings reared at 100/m^2 was due to more number of surviving individuals compared to other density level.

Results indicated that this valuable catfish could be induced to breed and reared successfully in hatchery condition. A higher dose of 1.5 ml ovaprim per kg body may be required depending on the maturity status of the female fish. The survival rate of fry does not affect on the present level of stock during the production of fingerlings. As the trials are few and the observations are in the preliminary stage, a detail work on its propagation, rearing and feeding is essential to popularize this endangered catfish in the future.

Table 1: Hormone-induced breeding of an endangered catfish, *Horabagrus brachysoma* in hatchery condition

Weight of brood (g)	Dose of inducing agent (Ovaprim) to female brood (ml/kg)	Latency period (h)	Weight of stripped egg (g) per 100 g female	Egg no/g stripped egg	Percent fertilization	Percent hatching	Time taken for hatching
60 (♀) 60 and 70(♂)	0.8(0.5+0.3)	20	18.13	915±2.24	73±4.92	48±1.88	21
60(♀) 70 and 100(♂)	1.0(0.8+0.2)	18	17.50	952±23.05	50±3.16	26.5±1.84	20
90(♀) 70 and 80(♂)	1.0	13	20.21	903±12.33	81±1.76	68±2.60	21
70(♀) 74 and 68 (♂)	1.5(1.0+0.5)	17	20.01	918±17.4	70±4.38	41±2.45	22

Table 2: Variations of water quality parameters in larval and fingerling tanks during 60 and 30 days of rearing periods respectively.

Water quality parameters	Larval rearing tanks	Fingerling rearing tanks
pH	7.4-7.8	7.2-7.8
Temperature (°C)	27-29	29-31
Dissolved oxygen (mg/l)	6.2-6.6	5.2-5.8
Total alkalinity (mg/l)	120-126	118-130
Ammonia (mg/l)	0.005-0.008	0.005-0.01

Table 3: The rearing performance of *Horabagrus brachysoma* larvae on growth and survival during sixty days rearing period in indoor hatchery system for the production of fry.

Attempts for rearing	Final length (mm)	Final weight (mg)	Specific growth rate (SGR)	Percent weight gain	Survival (%)	Total Biomass (g)
Trial-1	29.4±1.46	243.4±30.19	8.75	18,884	76.12	142
Trial-2	31.4±0.64	314.40±15.83	9.17	24,431	64.25	168

Table 4: The density dependant nursery rearing of *Horabagrus brachysoma* fry on growth and survival during thirty days for fingerling production.

No of fry stocked/m^2	Final length (mm)	Final weight (mg)	Specific growth rate (SGR)	Percent weight gain	Survival (%)	Total Biomass (g)
50	41.5±1.1	832.35±25.87	3.64±0.11	198.5±9.5	97.75±0.25	202.5±2.50
100	38.05±0.95	611.61±43.59	2.85±0.24	119.5±15.5	90.87±1.87	295±20.0

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