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Preliminary observations on breeding and fry rearing of pangas (*Pangasius hypophthalmus*) in eastern terai region of Nepal

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Abstract
River catfish (*Pangasianodon hypophthalmus*) locally known as pangas is one of the major food fish species with its highest productivity in culture system. In recent years, fish farmers of Nepal have shown interest to grow this species in ponds aiming to increase profitability and satisfy ever increasing market demand for fish. Seeds (fry) of this fish is not readily available and the technology of seed production has not been well adopted and verified in the country. Attempts were made on breeding and fry rearing of Pangas at RARS, Tarahara and observations were made on reproductive and nursing characters and performance. Pangas matured at 3^{+} year age in pond environment and spawning season observed was early June to September when water temperature ranged between 26 ºC to 31 ºC. Gonado-sometic index during spawning period estimated was 17.5±4.1% and fecundity ranged between 117000 to 153000 eggs/kg spawner. Ovulin (LHRH-A) at dose 0.5 ml/kg spawner was found effective to induce spawning after 8-14 h of latency period. Mean fertility rate and hatching rate from five breeding episodes estimated was 90.1±5.9% and 73.2±11.6%, respectively. Post-hatching survival of larvae was poor (<5% within 48 h) due to high cannibalism. Day-old larvae stocked at low density (0.6 million/ha) in rotifer enriched nursery pond and fed with a custard egg and soya powder at early days and later fed with carp fry diet resulted in 18.3% survival of fry with growth rate of 0.2g/day in 45 days of rearing. Concentrated studies on nursing management synchronized with live food production in nursery ponds for pangas larvae have been suggested.

Keywords: pangas, larvae, cannibalism, nursing, live food

1. Introduction: Background
River catfish (*Pangasius hypophthalmus*) locally known as pangas is one of the major food fish species in the Mekong River fishery, one of the largest and most important inland fisheries and highest productivity in culture system (Wagle, *et.al*.2017) [1]. These Pangas have high correction factor, fast growth and adaptability to a wide range of culture conditions. The breeding season of these fish reported between June and August (David, 1963) [2]. Pangas has been suitable candidate for both monoculture and polyculture with carps in ponds (Rahman, 1992) [3].

Larvae rearing could be done successfully in ponds for pangas in Vietnam, this technique has not been well adopted in Nepal (Wagle *et al.* 2017) [4]. In recent years, fish farmers of Nepal have shown interest to grow this species in ponds aiming to increase profitability and satisfy ever increasing market demand for fish. However, unavailability of fry is the main constraint towards culture of this species as breeding techniques have not been established in Nepal. In order to overcome the seed constraint, attempts were made on breeding and fry rearing of Pangas at RARS, Tarahara and observations were made on reproductive and nursing characters and performance. This report presents the outcome of such efforts.

2. Breeding and Rearing Management
One-year old pangas with an average weight of 850 g were collected and transported from farmer's pond, Chitwan to Regional Agriculture Research Station, Tarahara. Pangas was reared in earthen pond conditions and following recommended management practice for carps. The fish were provided with supplemental feed containing 25% crude protein at the rate of 4% of their body weight per day. After two years of rearing in captivity the fish reached to a size ranged from 2.5 kg to 3.0 kg and showed the maturity characteristics. Induced breeding was carried out during June to September. Mature females were randomly selected based on the display of a swollen and soft abdomen with a pinkish and protruding genital opening while mature males were selected based on the availability of milt following gentle pressure in the abdominal region. Hormone Ovuline® (LHRH-A) at dose 0.5 $mlkg^{-1}$ of spawner and 0.25 $mlkg^{-1}$ male was administered to the selected brood.

Fig 1: selection of brood fish

Fig 2: stripping of egg

Fig 3: mixing of egg and milt

Eggs from ovulated females were stripped into fertilization trays. Following deposition of eggs on the tray, milt was quickly stripped from the males into the tray. Fertilization of eggs was done by mixing the eggs and milt, and allowing the eggs to stand for 3 to 5 minutes. Following fertilization, the eggs were immediately spread on the substrate placed in a rectangular tank (30-40 cm water depth) for incubation. Continuous water flow was maintained in the incubation tank. Hatching commenced after 23 to 28 hours of incubation.

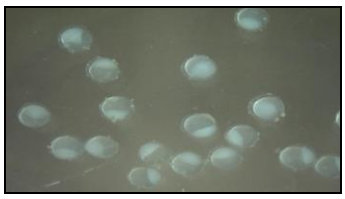

Fig 4: fertilized egg

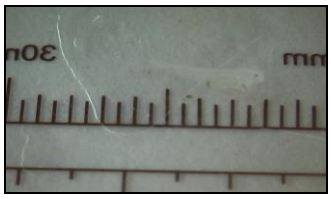

Fig 5: one day hatchling

Day-old larvae of pangas were transferred to zooplankton regulated nursery ponds. The nursery pond was prepared by the application of chicken manure at 5 tha^{-1} to enhance rapid growth of zooplankton. Rotifer, the most preferable live food for pangas larvae, was regulated in nursery ponds through the application of Malathion (phosphoric ester) 48 h prior to the stocking of fish larvae. Supplemental feed comprised of custard egg and soya powder was provided to the larvae at 10% of fish biomass daily in earlier days of nursing. Later pangas received carp fry ration at the rate of 5% of fish biomass daily. Reproductive performance and growth of pangas were estimated/measured following standard norms and formulas.

3. Statistical Analysis

Data processing and illustrations were performed using Microsoft excel. Differences between treatments were analyzed with Student t-test using SPSS ver. 20.

4. Results and Discussion

Pangas (*P. hypophthalmus*) matured at 3^{+} year age in pond environment. Van Zalinge (2002) [4] suggested at first reproduction to be approximately at 3-5 kg or 60 cm. Rahman (1992) [3] also reported that pangas attains maturity in the fourth year of its life in Bangladesh. Spawning season observed was early June to September when water temperature ranged between 26ºC to 31ºC. Spawning season observed in this study was highly corroborated with the findings of Khan and Mollah (2004) [5]. The results of several breeding episodes carried out in this study within reported spawning season indicated that the peak breeding season of the species was July. Bui *et al.* (2010) [6] reported that the pangas spawned throughout the year in Vietnam, but the peak breeding season is May to July. Gonado-somatic index during spawning period estimated was 17.5±4.1% and fecundity ranged between 117000 to 153000 $eggskg^{-1}$ spawner. Khanh (1996) [7] and Xuan (1994) [8] has estimated the fecundity of approximately 112,000 to 138,000 $eggskg^{-1}$ after age four.

Ovulin (LHRH-A) at dose 0.5 $mlkg^{-1}$ spawner was found effective to induce spawning after 8-14 h of latency period. The latency period between the last hormone injection and ovulation was negatively correlated with water temperature (Legendre *et al.* 2002) [9]. Mean fertility rate and hatching rate from five breeding episodes estimated was 90.1±5.9% and 73.2±11.6%, respectively. Hatching of fertilized eggs in this study occurred within 23 to 28 hours of incubation at 26 to 31°C and this finding was consistent with that of Mollah and Khan (1998) [10] that reported the incubation period of pangas eggs to be between 29 to 33 hours at 26 to 28°C.

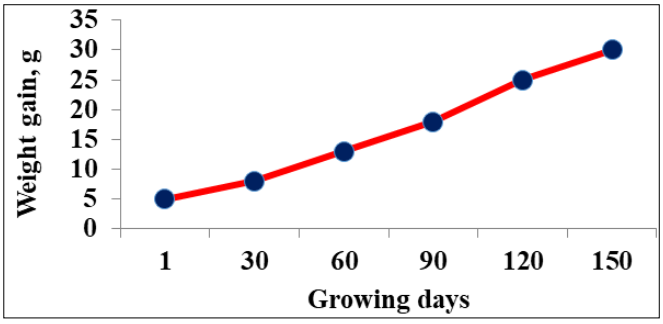

Fig 6: Growth trend of *P. hypophthalamus*

Post-hatching survival of larvae was poor and most of the cases it was <5% survival. Most of the larvae died at the first swimming and first feeding stages. This might be due to stress imposed on the females for repeated checking during the breeding and cannibalism behavior of young larvae. Nash and Kuo (1976) [11] reported that the ovarian development of females was seriously affected by stress. Further research needs to be done to find out the inherent reason behind mass mortality of larvae.

Day-old larvae stocked at low density (0.6 $millionha^{-1}$) in rotifer enriched nursery pond and fed with a custard egg and soya powder at early days and later fed with carp fry diet resulted in 18.3% survival of fry with growth rate of $0.2gday^{-1}$ in 45 days of rearing. Bui *et al.* (2010) [6] reported that the stocking densities of larvae in highly variable among farmers in Vietnam and ranged from 250-2000 larvae/m^2 (average 863 larvae/m^2). Feeding of live foods for the first 3-5 days in tank condition could result in 91-93% survival of pangas (Le *et al.*, 2002) [12]. Concentrated studies on nursing management synchronized with live food production in nursery ponds for pangas larval rearing.

5. Conclusion

Ovulin at dose 0.5 $mlkg^{-1}$ produced the consistent spawning of pangas. Fertilization and hatching rates were high when the

females were treated with this dose. Based on the information generated in this study, causes for mass mortality of the larvae just after hatching need to be explored so that a reliable technique of fry production can be established. Studies are also necessary on nursery management synchronized with live food production in nursery pond for pangas larvae.

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7. References

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