**Induced Spawning and Larval Rearing of Climbing Perch, Anabas testudineus under Controlled Conditions of Raipur (Chhattisgarh)**


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**Introduction**

*Anabas testudineus*, commonly known as “Koi/Kawai” or “climbing perch” is found in both fresh- and brackish water as well as estuaries of Pakistan, India, Nepal, Bangladesh, Sri Lanka, southern China, Myanmar, Thailand, Singapore, Indonesia, Malaysia, Laos, Vietnam, Brunei and the Philippines (Talwar and Jhingran, 1991; Chonder, 1999; Jayaram, 2010; Pal and Chaudhry, 2010). It fetches high price in the markets of India and south-east Asian countries. This species possesses accessory respiratory organs (Olson et al., 1986; Munshi et al., 1986) and cultured with Clarias batrachus (magur) and Heteropneustes fossilis (singhi) in swampy, derelict and sewage water as well as paddy fields unsuitable for carp culture (Dehadrai et al., 1986; Dehadrai and Kamal, 1993). Demand of this species is growing day-by-day in different parts of the country but fish farmers are not getting enough seed for commercial aquaculture. Since enough seed is essential for diversification of aquaculture (Kutty, 2001), development and standardization of seed production technology of the candidate species is required (Khan 1972; Khan and Mukhopadhyay, 1975; Thakur 1991; Tripathi, 1990; Nayak et al., 2000, 2001; Pandey and Koteeswararam 2004; Singh and Pandey 2009; Chaturvedi et al., 2012, 2013). Though the climbing perch is not a catfish but cultured with singhi and magur, however, culture of the species has not yet picked up in India due to poor seed availability owing to non-availability of brooders or lack of breeding and hatching technology (Dehadrai and Kamal, 1993; Kumar et al., 2012). An attempt has, therefore, been made to induce breeding and larval rearing of the commercially important *A. testudineus* under agro-climatic conditions of Raipur (Chhattisgarh). Since physico-chemical conditions of water like pH, dissolved oxygen, temperature, alkalinity as well as metabolites play important role in fish breeding (Dwivedi and Ravindranathan, 1982), these parameters were monitored regularly and kept optimal while undertaking induced breeding and larval rearing experiments on the climbing perch.

**Materials and Methods**

For breeding experiments, mature and healthy brooders of *Anabas testudineus* were procured from Private Fish Farm (30 km away), transported to Chhattisgarh State Fisheries Department, Raipur, given bath treatment in KMnO4 solution (3 ppm) and acclimatized in cemented cistern size (3x2x1 m) with water depth of 10-12" under hatchery conditions. Physico-chemical parameters of water such as pH, temperature, dissolved oxygen, alkalinity, nitrite and nitrate were monitored regularly and found to be within the optimum range (Table 1). Since body colouration in *A. testudineus* appears only during breeding season (Mookerjee and Mazumdar, 1946; Dehadrai et al., 1973; Banerjee and Prasad, 1974; Banerjee and Thakur, 1981; Behera et al., 2015), male and female brooders were identified based on secondary sexual characters - the males being darker in colour with oozing milt by applying slight pressure on the belly while females possessed light brown pigmented spot on body with bulging abdomen (Fig. 1-2). An attempt has, therefore, been made to induce breeding and larval rearing of the commercially important...
Fig. 1: Brooders of *Anabas testudineus*.

Fig. 2: Checking of male brooders.

Fig. 3: Intraperitoneal injection to brooder.

Fig. 4: Intramuscular injection to female brooder.

Fig. 5: Spawn of *Anabas testudineus*.

Fig. 6: Rearing of *Anabas testudineus* spawn.
above dose (Fig. 4). The injected brood fish sets comprising one female and two males (sex ratio 2:1) were released in cement cistern (Banerjee and Thakur, 1981). Breeding was observed in all the 3 sets of climbing perch but the latency period prolonged to 18-28 hours. Interestingly, A. testudineus given intramuscular (i.m.) injection of the hormonal drug also elicited successful spawning but the latency period was prolonged to 2-3 more hours. Fertilized eggs were transferred to fiber glass tub (size $3 \times 2 \times 1$") with water depth 10" provided with aeration (Fig. 5). Hatching of fertilized eggs took place in cemented cistern by supplying oxygen through aerators (Fig. 6). Hatching of fertilized eggs took place in cemented cistern by supplying oxygen through aerators. Flowing water were stopped and spent brooders taken out with the help of hand net.

### Results

Effects of ovatide administration on induced spawning of the climbing perch, *A. testudineus*, have been summarized in Table 2. In the present study, induced breeding was achieved successfully in all the three sets of *A. testudineus* without sacrifice of any male or female but the latency period prolonged to 18-28 hours (2 hours more in case of i.m. injection). The eggs (released in batches) were very minute and floating on the surface of water. The fertilized eggs were bright clear and transparent while unfertilized eggs appeared milky and opaque. The diameter of fertilized eggs ranged between 0.6-0.7 mm. Mookerjee & Mazumdar (1946), Banerjee & Prasad (1974), Khan & Mukhopadhyay (1975) and Zalina *et al.* (2012) also recorded diameter of fertilized eggs of the climbing perch between 0.7-

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Table 1: Physico-chemical parameter of hatchery water at Raipur.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Date</th>
<th>pH</th>
<th>Temperature (°C)</th>
<th>DO$_3$ (ppm)</th>
<th>Alkalinity (ppm)</th>
<th>Nitrite (ppm)</th>
<th>Nitrate (ppm)</th>
<th>Hatching hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.07.2015</td>
<td>7.4</td>
<td>27.4</td>
<td>3.4</td>
<td>100</td>
<td>0.02</td>
<td>Nil</td>
<td>23.4</td>
</tr>
<tr>
<td>2</td>
<td>21.07.2015</td>
<td>7.2</td>
<td>27.8</td>
<td>3.8</td>
<td>120</td>
<td>0.01</td>
<td>0.01</td>
<td>-----</td>
</tr>
<tr>
<td>3</td>
<td>22.07.2015</td>
<td>7.6</td>
<td>28.2</td>
<td>3.6</td>
<td>110</td>
<td>0.01</td>
<td>0.01</td>
<td>-----</td>
</tr>
<tr>
<td>4</td>
<td>23.07.2015</td>
<td>7.4</td>
<td>27.2</td>
<td>4.0</td>
<td>130</td>
<td>0.02</td>
<td>Nil</td>
<td>24.0</td>
</tr>
<tr>
<td>5</td>
<td>24.07.2015</td>
<td>7.2</td>
<td>28.2</td>
<td>3.8</td>
<td>110</td>
<td>0.03</td>
<td>0.01</td>
<td>-----</td>
</tr>
<tr>
<td>6</td>
<td>25.07.2015</td>
<td>7.5</td>
<td>27.8</td>
<td>4.2</td>
<td>110</td>
<td>0.02</td>
<td>0.01</td>
<td>-----</td>
</tr>
<tr>
<td>7</td>
<td>26.07.2015</td>
<td>7.5</td>
<td>27.0</td>
<td>3.8</td>
<td>120</td>
<td>0.02</td>
<td>0.01</td>
<td>24-25</td>
</tr>
<tr>
<td>8</td>
<td>27.07.2015</td>
<td>7.4</td>
<td>27.6</td>
<td>4.0</td>
<td>120</td>
<td>0.01</td>
<td>Nil</td>
<td>-----</td>
</tr>
</tbody>
</table>

Table 2: Details of Induced breeding experiments on *Anabas testudineus* at Raipur.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Date</th>
<th>Weight of fishes (gm body weight)</th>
<th>Dose of hormone (ml/100 g)</th>
<th>Number of fertilized eggs</th>
<th>Hatching (%)</th>
<th>Number of spawn</th>
<th>Fry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male 32.0-32.5 Female 42.0</td>
<td>Male 0.02-0.02 Female 0.06</td>
<td>4,800</td>
<td>90</td>
<td>4,320</td>
<td>1710</td>
</tr>
<tr>
<td>1</td>
<td>20.07.2015</td>
<td>32.0-32.5</td>
<td>42.0</td>
<td>0.02-0.02</td>
<td>0.06</td>
<td>2,600</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>23.07.2015</td>
<td>32.0-36.0</td>
<td>38.0</td>
<td>0.02</td>
<td>0.05</td>
<td>2,080</td>
<td>1248</td>
</tr>
<tr>
<td>3</td>
<td>26.07.2015</td>
<td>33.0-42.0</td>
<td>39.2</td>
<td>0.03</td>
<td>0.04</td>
<td>2,880</td>
<td>1728</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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With the discovery of GnRH-based drugs, induced Janakiram, 1991; Thakur, 1991; Chondar, 1999). Vidyarthi, 1990; Tripathi, 1990; Rao and 1975; Zonneveld et al (Ramaswamy and Sundararaj, 1956, 1957; Devaraj, 1958, 1959; devaraj et al, 1988; Kohli, 1989; Kohli and Vidyarthi, 1990; Tripathi, 1990; Rao and Janakiram, 1991; Thakur, 1991; Chondar, 1999)). The use of GnRH-based drugs has also been attempted during the recent years (Sarkar et al., 2005, 2015; Bhatcharaya and Homechoudhuri, 2009; Kumar et al., 2010; Zalina et al., 2011, 2012; Loh and Ting, 2015; Singh et al., 2015) with varying success. In the present study, ovatide in the dose of 0.06 ml/100 g body weight in females and @ 0.04 ml/100 g body weight in males induced successful spawning in A. testudineus. Sarkar et al. (2005), Perera et al. (2013) and Singh et al. (2015) also achieved success with similar dose of GnRH-based drugs, however, Kumar et al. (2010) used ovaprim in the dose of 15 ml/kg body weight for successful induced spawning of the species in different seasons (February through August). In the present study, spawning took place in batches similar to those reported by other workers in A. testudineus (Mookerjee and Mazumdar, 1946; Banerjee and Prasad, 1974; Kumar et al., 2010). Since water temperature and pH play pivotal role in induced spawning and larval rearing.
of the climbing perch, it ranged between 27.4-28.2°C and 7.2-7.6, respectively in the present study which were within the optimum range. Mookerjee and Mazundar (1946) and Zalina et al. (2012) also found 26-27°C to be optimum temperature for induced spawning of the climbing perch. In the present study, air-breathing organ developed on day 10 when larvae measured 10.6-11.8 mm. Hughes et al. (1986) reported air-breathing in 13-14 days old hatchling. Average fertilization rate of 90% under the hatchery conditions found in the present study indicates successful natural spawning (without stripping) in the species. Indoor rearing of the larvae was done on feed such as plankton, egg custard and chopped molluscan meat with water depth of 6-8”.

From the three sets of brooders, 10,600 hatchlings and 4,686 fry of A. testudineus were produced under agro-climatic conditions of Raipur (Chhattisgarh).

Though A. testudineus has been kept under Data Deficient-ver 3.1 category of IUCN Red List of Threatened Species (Pal and Chaudhry, 2010), population of this species has declined drastically in some of its natural habitats and declared vulnerable in West Bengal (Mukherjee et al., 2002) and endangered in Bangladesh (Rahman and Marimuthu, 2010; Chakraborty and Haque, 2014), the successful induced spawning of the climbing perch pave the way for rehabilitation of this species through conservation aquaculture (True et al, 1996; Anders, 1998).

References


Chaturvedi, C.S., N. Ram, K.D. Raju and A.K. Pandey (2015). Induced breeding of Indian major (Catla Catla) and silver carp (Hypophthalmichys molitrix) employing synthetic hormone analogues under agro-climatic conditions of Andaman and Nicobar islands, India. Journal of Experimental Zoology India, 18: 731-735.


