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# Producing hybrid fry from cross-breeding between *Barbus xanthopterus* females and *Barbus sharpeyi* males in Marine Science Center hatchery

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## Abstract

The process of hybridization was carried out between female of *Barbus xanthopterus* X male of *Barbus sharpeyi* by artificial reproduction in Marine Science Center hatchery. Environmental factors (Temperature, salinity, dissolved oxygen, and pH) of the hatchery water were measured. The environmental factors within the optimum limits for the process of artificial breeding of these two species. The fertilized eggs were hatched and the larvae were reared inside the hatchery for six days. Later the hybrid larvae transferred to floating cages in the earthen pond, the initial larval weight was 5.2 mg. The rearing of hybrid larvae continued for 20 days and the average of final length was 20 mm and average of final weight was 41mg.

## 1- Introduction

Sexual hybridization is a traditional method for cultivating new animal breeds or varieties. On the basis of natural and artificial selection, some animal individuals obtained from some different taxa but closely related species (YAN and ÖZGÜNEN ,1993)The hydridization is a mating and crossing of two different species to produce a "hybrids", which could have superior characterstics such as faster growth, better feed conversion, tolerance of low oxygen, increased resistance to many diseases, tolerance to crowded growth conditions in ponds, uniformity in size and shape (Masser and Dunham, 1980).

Many studies had been done on hybridization (Lawrence *et al*. 1998; Lawrence and Morrissy 2000; Lawrence *et al*. 2000). Sexual hybridization might occasionally happen in nature, but most were conducted artificially (YAN And ÖZGÜNEN,1993). Methods and procedures for artificially spawning the female grass carp (*Ctenopharyngodon idella* X male bighead carp (*Aristichthys nobilis*) are presented, brood stock selection and treatment, hormone injections, ovulation, fertilization, hatching techniques and stocking rates are discussed, this paper outlines the procedures necessary to successfully produced hybrid grass carp (Freeze, and Henderson,1983).

**2-Materials and methods**

Mature of female *Barbus xanthopterus* and male *Barbus sharpeyi* were transferred from field to the hatchery. The male and female were placed in brooders tanks, with sex separated. The dissolved oxygen, temperature and water current was controlled to the optimum levels (Almukhtar *et al*., 2009), and the fishes were watched carefully.

The mature eggs of *B.xanthopterus* and sperms of *B.sharpeyi* were obtained after the induced spawning of these species by using the pituitary gland extract (Al Mukhtar *et al*.,2009). Hybridization was carried out by obtaining the sperm from *B. sharpeyi* and eggs from one female of *B.xanthopterus*, fertilized eggs was placed in a pot (2L) and washed three times with hatchery water, for 10 minutes each time. The fertilized eggs reached the maximum size (15 - 2.2 mm) is ready to incubation, , this indicates the end of the process of the washing. Tannic acid was not used, due to the egg shells good rigidity and the absence of the viscosity.

Fertilized eggs were put in hatching zoug jars, with water flow of 2L/min. Incubating temperature was 22-24C$^{\circ}$, and amount of dissolved oxygen did not reduce from 6.0 ppm. No infection was observed on the fertilized eggs during incubation. However it had been disinfected by malachite green by 0.1ppm for 5 min. The fertilization rate was calculated after 2 hours from incubation. The hatched larvae were received in big first larval rearing tanks (200L). The hatching was accomplished after 72 hours.

After four days the larvae were transferred to a small floating cages (75X75X75cm), with net tissue 500-1000 microns mesh size. The cages were placed in well fertilized earthen pond. The larvae were fed twice daily, in the morning and afternoon, with diet composed of soybean powder and fish meal as well as natural food collected by zooplankton net from the same pond.

**3-Results**

Table(1) shows the environmental conditions in the brooders tanks inside the

hatchery. The water temperature was become suitable for induced spawning, after its decrease in the previous days.

The results showed that cross breeding between *B.xanthopterus* and *B.sharpeyi* was succeeded by the artificial fertilization, and the fertilization rate was 80%. The hatching rate was 80% too.

The environmental conditions of the floating cages (Table 2) showed that the temperature was ranged between 22.5-25.3. The salinity ranged between 2.2-3.1ptt. The pH and D.O were decreased during 30/4 to 7.3 and 5.0ppm respectively.

**Table (1): Some environmental conditions of the brooders tanks inside the hatchery.**

| Date | D.O. ppm | S.‰ | pH | Temp. C° |
|---|---|---|---|---|
| 14/3/2009 | 9.4 | 2.95 | 7.7 | 20 |
| 15/3 | 5.5 | 2.92 | 8.32 | 19.4 |
| 16/3 | 9.1 | 2.90 | 7.7 | 20.5 |
| 17/3 | 9.9 | 2.90 | 7.5 | 19.1 |
| 18/3 | 6.47 | 2.90 | 8.5 | 17.7 |
| 19/3 | 10.0 | 2.90 | 7.7 | 19.5 |
| 20/3 | 9.0 | 2.90 | 7.7 | 19.5 |
| 21/3 | 6.19 | 2.90 | 7.66 | 20.1 |
| 22/3 | 6.2 | 2.90 | 7.7 | 19.6 |
| 23/3 | 6.1 | 3.00 | 7.7 | 20.16 |
| 24/3 | 6.1 | 2.98 | 7.6 | 22.16 |

**Table (2): The ecological characters of cage water.**

| History | D.O. ppm | S.‰ | pH | Temp.C° |
|---|---|---|---|---|
| 20/4/2009 | 8.0 | 2.9 | 8.1 | 24.0 |
| 21/4/2009 | 8.2 | 3.0 | 8.1 | 24.0 |
| 22/4/2009 | 7.0 | 3.1 | 7.8 | 22.5 |
| 23/4/2009 | 6.4 | 3.0 | 7.9 | 24.2 |
| 27/4/2009 | 6.0 | 3.0 | 7.8 | 24.0 |
| 30/4/2009 | 5.0 | 2.9 | 7.3 | 25.0 |
| 7/5/2009 | 8.0 | 2.2 | 7.9 | 25.3 |

**Table (3): rates of lengths and weights of hybrid larvae cultured in floating cage.**

| History | Hybrid | |
|---|---|---|
| | Length(mm) | Weight(mg) |
| 20/4/2009 | - | 5.2 |
| 29/4/2009 | 13 | 13 |
| 7/5/2009 | 20 | 41 |

## 4- Discussion

Hybridization in fish is a natural phenomenon and the hybrids have better growth rate and high resistivity against unfavorable ecological conditions (Reddy, 2000). Hybrids of major carps are being successfully produced in public and private hatcheries and are available for farming. The pituitary gland of common carp was used for induce spawning in fish in *B. sharpeyi* and *B. xanthopterus* used in the experiment, as Jhingran and Pullin (1996) stated that the pituitary gland of common carp fish are the most commonly used to induce spawning cyprinid fish .

The percentage of fertilization is very high and reached 80%, use water to activate the sperm to carry out appropriate mitigation for the enrichment process (Al-Zaidi, 2008). Hatching rate was also high for the larvae of hybrids where the movement is slow and stable at the bottom of the glass incubators. Results showed that the growth of young hybrids is higher than the youngs of *B. xanthopterus* in the same period, fish hybrids weighed after 18 days of hatching amount 41 mg, while *B. xanthopterus* weighed 30 mg after the same period (Al-Mukhtar *et al*., 2008). This good conclusion for the hybrid fish where has high growth better than the parent species, this agree with Masser and Dunham (1998); Giudice (1966);Yant *et al*. (1975); Dunham *et al*. (1983); Dunham *et al*. (1987); Dunham *et al*. (1990); Ramboux (1990);Wolters *et al*. (1996); Dunham and Argue (1998); Dunham and Brummett (1999); Chatakondi et al.(2000); Bosworth *et al*. (2004) Li *et al*.( 2004) explained the hybrid generally performs better than either parent species for several important production traits including faster growth, better feed conversion, tolerance of low oxygen, increased resistance to many diseases.

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# إنتاج سويبحات هجينة من تكاثر اصطناعي بين اناث الكطان *Barbus xanthopterus* وذكور البني *Barbus sharpyie* في مفقس مركز علوم البحار

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**الخلاصة**

أجريت عملية التهجين ما بين انثى من اسماك الكطان *Barbus xanthopterus* وذكر من اسماك البني *Barbus sharpeyi* بواسطة التكثير الاصطناعي في مفقس مركز علوم البحار– جامعة البصرة. وقيست العوامل البيئية (درجة الحرارة والملوحة والأوكسجين المذاب، ودرجة الحموضة) لمياه المفقس. العوامل البيئية كانت ضمن الحدود المثلى لعملية التكثير الاصطناعي لهذين النوعين. فقست البيوض المخصبة وحضنت اليرقات داخل المفقس مدة ستة أيام. بعد ذلك نقلت اليرقات الهجينة إلى الأقفاص العائمة في حوض ترابي ، وكان الوزن الابتدائي لليرقات 5.2 ملغم. بلغت فترة حضانة اليرقات الهجينة مدة 20 يوما وبلغ متوسط الطول النهائي 20 ملم ومتوسط الوزن النهائي هو 41 ملغم.