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TRAILS FOR FRY PRODUCTION OF THE BAGRUS BAYAD AT DIFFERENT WATER LEVELS IN EARTHEN PONDS 1ST RECORD

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Abstract

Seed production of Bagrus bayad females brooders 3-4 years old having an average body length of 54.8± 0.5, 52.1± 0.6 and 54.2± 0.4 cm at three water level (75, 100 and 150 cm), respectively. Three groups of earthen ponds 1000 m^2 area were used representing three treatments (3 replicates, 15 female and 15 males each). The experiment lasted 90 days from March to May 2012. Fish were fed 6 days a week and water was renewed weekly. Water temperature ranged between 22 to 24 °C during the experimental run.

The results of seed production/pond, mean number of seed/ female and relative fecundity of the third group (depth 150 cm) were significantly higher ($P<0.05$) than of the first group, but the differences between first group and second group was no significantly. Contrary the Nested (diameter and depth) of the first group were significantly higher ($P<0.05$) than of the second group, but the differences between first group and third group was not significantly. There were no significant differences among average body weight and body length / fry.

Key words: Reproductive performances; Water levels and *Bagrus bayad*

INTRODUCTION

Bagrus bayad in many species of family catfish are in significant commercial and economy important fish inhabiting the inland fresh water of many parts of the world particularly in tropical and subtropical regions and has characteristics adaptability for culture. B. bayad is one of the most preferable freshwater fish foods in Egypt. It constitutes about 1.5 % of the total fish production of Egypt (GAFRD, 2000).

Investigation concerning the spawning season and breeding habits are very essential for the improvement of any fishery. So, good knowledge of the breeding biology of such an important commercial fish (B. bayad) is of vital importance for the management of its fishery. Few litratures on the spawning season of B. bayad. Nawar (1957) stated that the breeding season of B. bayad in the Sudan lasts approximately from April to May. Bishai(1970) found that ripe fish (B. bayad) may be present during 8 months of the year (January – August), but the major breeding season may be considered to occur through 5 months (March – July) with a peak in May, the same author accounted that B. bayad as well as other members of family Bagridae in the Sudan spawn on rocky bottom, where the current velocity is moderate and oxygen content is high. Hashem (1981) found that breeding season of B. bayad was noted through the examination of 253 fish, ranging from 51 to 84 cm. Total. Length collected during the period November to April. The results obtained indicated that the ripening of B. bayad in March and reaches the pre-spawning stage in April, The same author mentioned that the mean relative fecundity estimated for fishes caught In November was low (about 10 eggs /gm , of fish weight),while this reached high value (about 14 eggs /gm , of fish weight) for fishes obtained in April. Nearly in the central part of the nest, there is a single well formed hole of about 10-15cm, in diameter and 10-15 cm in depth. It seems that the dimensions of this hole also depend on the size of fish head. Inside this central hole, the eggs are laid and the larvae stay for some days after hatching. The larvae leave the hole when disturbed to swim here and there within the nest and return back to the hole when the disturbance was covered and the same author found that all fecundity estimations, it has been shown that for any species the fecundity increase with the increase in size or weight of the fish. For example, fishes of 80 cm T.L. have individual fecundity ranging from 14 to 73 thousand eggs. For all the length range (57 – 84 cm. T.L.) the individual fecundity of B. bayad varies from 10 to 80 thousand eggs, while average fecundity for the different length groups varies from 18-68 thousand eggs.

Khallaf and Authman (1991) indicates that the rise of temperature (about 20 °C) is parallel to the increase in the value of the Gonad Somatic Index

and consequently in the percentage of ripe fish. The average G.S.I. was 0.60 in February, increased to 0.83 in March and suddenly reached high value 1.74 in April. This means that there is a correlation between the rise of temperature in March – April and the increased percentage of ripe fish.

Nikolsky (1963) stated that many fishes of the family Bagridae lay their eggs in a burrow (hole) which is diged out especially for this purpose, and the male then protects the nest. Something like spawning colony developed.

Fishes of at least eight families have been reported to assume a role of the host, of which centrachids, cichlids and cyprinids are common (Copley, 1958 ; Sundara, 1962 and Wisenden , 1999)

Ochi *et al*. (2001) found that during the brooding period Bagrid catfish, host males spent most of their time fanning their pectoral fins and undulating the posterior part of their bodies on the nests to prevent oxygen deficiency..

The aim of the present study was to evaluate the reproductive capability of *Bagrus bayad* at different water levels throughout success spawning to establish possible broodstock management strategies that may be adopted by hatcheries to improve fry production on large scale.

MATERIAL AND METHODS

The present study was conducted at Abbassa Fish hatchery, Central Laboratory for Aquaculture Research, Abbassa. A total number of 90 apparently health *Bagrus bayad* males and females brooders, with an average body length 54.8 ± 0.5 , 52.1± 0.6 and 54.2 ± 0.4 cm* and body weight of 1010.3 ± 2.8, 955.3 ± 4.1 and 961.9 ± 3.5 g respectively, were randomly divided to 9 groups representing three treatments (3 replicates, each 5 females / 5 males). The fish were accommodated in 9 earthen pond (muddy bottom) 1000 m2, filled with fresh water 0.75, 1.00 and 1.5 m depth respectively. Five common carp fishes having the 1 kg average body weight were placed with females in each pond. Fish were fed at a rate of 3% of their body weight supplementary feed containing 35% crude protein 6 days a week. The fertilization of ponds was performed by spreading chicken manure at rate of 1

m^3 on pond bottom before filling with water. Ponds were fertilized 90 kg of chicken manure, 8 kg super phosphate and 2.5kg potassium nitrate /15 days/pond during 3 months.

In April 2012, when climatic conditions were suitable for spawning and average daily water temperature was 22-24^oC, females starting in spawning season. Water was renewed every week with feeble running fresh water. Nylon screens with 1 mm mesh size were used to prevent the parents and fry from escaping.

At harvest, females were collected gently, weighed and isolated separately and temporarily with their males in hap's installed in ponds nearby. The end of May all seed were collected from each pond separately and counted. A sample of 50 fry/ pond was weighed and measured length. The ponds were cleaned, disinfected and refilled with fresh water and the parents were disinfected and released into their ponds again for the next harvesting.

Analysis of variance and SAS (2004) were used to detect differences in seed production due to treatment effects.

N. B *The selection of mature *Bagrus bayad* dependence mainly on body length more than body weight.

RESULTS AND DISCUSSION

Mean Water quality parameters during the experiment were adequate for the life fish were water temperature and dissolved oxygen concentration , pH, nitrate, nitrite, ammonia and salinity were monitored twice weekly throughout the study period using oxygen-meter (model YSI 58), pH-meter (Digital Mini-pH-meter model 55), Hach Spectrophotometer apparatus (model, DR 2010) respectively and salinity were determined biweekly according to the method of (Boyd 1979). Transparency of water was measured directly by using Secchi disc. (Dewis and Freiles, 1970). Mean water quality parameters during the experiment were illustrated in (Table 1).

Table (1): The mean values of some water Physico-chemical characteristics of earthen Bagrus bayad ponds during the experiment period.

Items	Mean	Items	Mean
Temperature	23± 3.1	**Nitrate (mg/l)**	0.01±0.1
PH	8.7± 0.2	**Nitrite (mg/l)**	0.02±0.1
Oxygen (mg/l)	7.1±0.1	**Ammonia(mg/l)**	0.04±0.2
Transparency(SD)	13±0.3	**Salinity (mg/l)**	0.3±0.02

Salinity was calculated by relation (1000 micromos =0.7g salinity according to Dewis and Freila, 1970.

The results of (Table 1 and Fig 1, 2, 3, 4 and 5) showed that the total seed production at water depth75 cm (first group) was 28280.0 ±379.5/ pond . Nested (diameter was76 .0 ± 1.3 cm and depth was 72.0 ±1.4 cm. Fry attained an average body weight of 6.5 ±2.5mg/fry and average body length of 5.8 ±1.6 mm/fry. At Water depth 100 cm (second group) the number of fry produced were 53496.8 ±427.9 seed/ pond. Nest (diameter was 74.0 ± 2.1 cm and depth was70.2 ± 2.0 cm). Average body weight was 5.9 ±1.9 mg/fry and average body length was6.1 ±2.1 mm/fry at the end of May. Total of seed production / pond obtained from the third group (at water depth 150 cm) was 53866.4 ±345.7. Nest (diameter was 75.2 ± 3.6cm and depth was71.2 ± 1.6 cm). Fry reached 6.2 ± 2.3 mg and 5.9 ±1.8 mm/fry average body weight and length, respectively. Statistical analysis indicated that mean of the total seed production/pond, mean number of seed/ female and relative fecundity of the third group were significantly higher ($P<0.05$) than of the first group, but the differences between third group and second group was not significantly. The highest seed production expressed in terms of seed / female / day, was obtained from water depth 1.5 m (179.5 seed / female / day), wherever water depth 1.0 m followed by (178.3 seed / female / day) and that had the water depth 75 cm. was the lowest (94.3 seed / female / day). The correct water depth (water level) of formed African catfish will certainly improve hatchery efficiency and mass production of seed (El-Naggar *et al*., 2006). These results were contrary with the findings of Adamek (1995); Brzuska *et al.* (1999); Viveiros *et al.*

(2002); El- Naggar *et al*., 2002 and 2006) showed that using naturally spawning ovulation ratio female kept at 25, and 50 cm water depth was 56.5 and 52.8 % in African catfish, respectively. In Bagrus bayad increase in ovulation may be due to increase the water level, affright , disturbance, light and stress, leads to a gonadotropin surge that decrease spawning.

Spawning is the outcome of a complex interplay of physiological and environmental factors. Richter *et al*. (1987) suggested the role of an endogenous rhythm determined by environmental factors in causing cyclical changes in ovarian activity.

The Nest (diameter and depth) of the first group were significantly higher ($P<0.05$) than of the second group, but the differences between first group and third group was not significantly. These results were agreement with Bishai (1970) accounted that the nest of B. bayad is relatively large depression having the shape of flat dish with dimensions differing according to the size of fish .The diameter of the nest is slightly larger than fish length and the depth is nearly equal to the high of fish.

Hashem (1981) and Ochi *et al.* (2001) who showed that bagrid catfish (B. bayad) fishes usually select a site for nesting on the muddy bottom, near the inlets of drains, mostly between water plants, at a depth from 50 to 100 cm, the nesting of B. bayad was concentrated between water plants in the shallow depth near the water inlet and the nesting happens in deeper water, even at a depth of 4 or 5 meters. In brood- mixing of the present study, host parents prepare a spawning and nursery substratum by gathering a large amount of shells and gravel sifted from the sediment (Ochi *et al*., 2001).

During the period of experiment, nest(hole) diameter and depth to water depth 75 cm attained largest size(76 .0 ± 1.3 cm and 72.0 ±1.4 cm) , however ,was in water depth 1.5 (75.2 ± 3.6cm and 71.2 ± 1.6 cm) and in water depth 1.0 m was (74.0 ± 2.1 cm and 70.2 ± 2.0 cm)). It seems that the dimensions of this hole depend on the size of fish head.

Table (2): Effect of water level on reproductive performance of Bagrus bayad.

Investigation	Water depth (75 cm)	Water depth (100cm)	Water depth (150 cm)
Ave. body length /females(g)	54.8 ± 0.5[a]	52.1 ± 0.6[a]	54.2 ± 0.4[a]
Nest(hole) diameter(cm)*	76.0 ±1.3[a]	74.0 ± 2.1 [b]	75.2 ± 3.6[ab]
Nest(hole) depth (cm)*	72.0 ±1.4[a]	70.2 ± 2.0 [b]	71.2 ± 1.6[ab]
Total number of seed/ pond	28280.0 ± 379.5[b]	53496.8 ± 427.9[a]	53866.4 ± 345.7[a]
Number of seed / female	5656.0 ± 273.1[b]	10699.3 ± 415.8[a]	10773.3 ± 425.2[a]
Ave. body weight /fry(g)	6.5 ±2.5[a]	5.9 ±1.9[a]	6.2 ±2.3[a]
Ave. body length /fry(mm)	5.8 ±1.6[a]	6.1 ±2.1[a]	5.9 ±1.8[a]
Relative fecundity**	5.6 ± 0.2[b]	11.2 ± 0.4[a]	11.3± 0.1[a]

*Nearly the nest, there is a single well formed hole of about 74.0 -76 cm, in diameter and 70.0 – 72.0cm in depth.

**Relative fecundity = number of seed / female body wt. of female.

a, b,c: means within the same raw having the same superscripts don't differ ($p<0.05$) significantly otherwise they do.

There were no significant differences among average body weight and body length / fry.

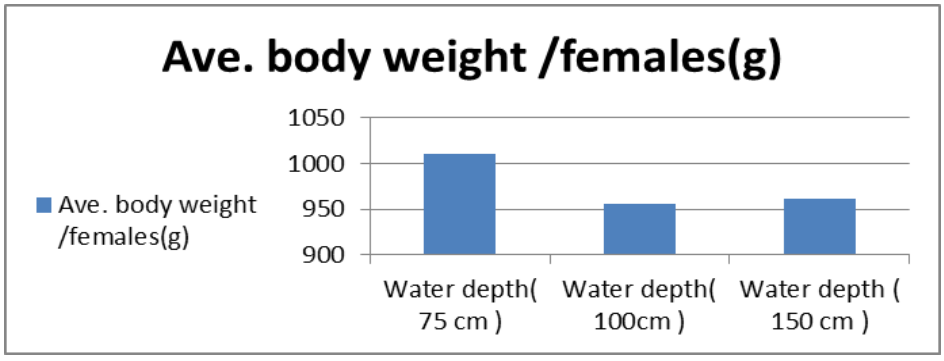

Fig (1): Body weight of female.

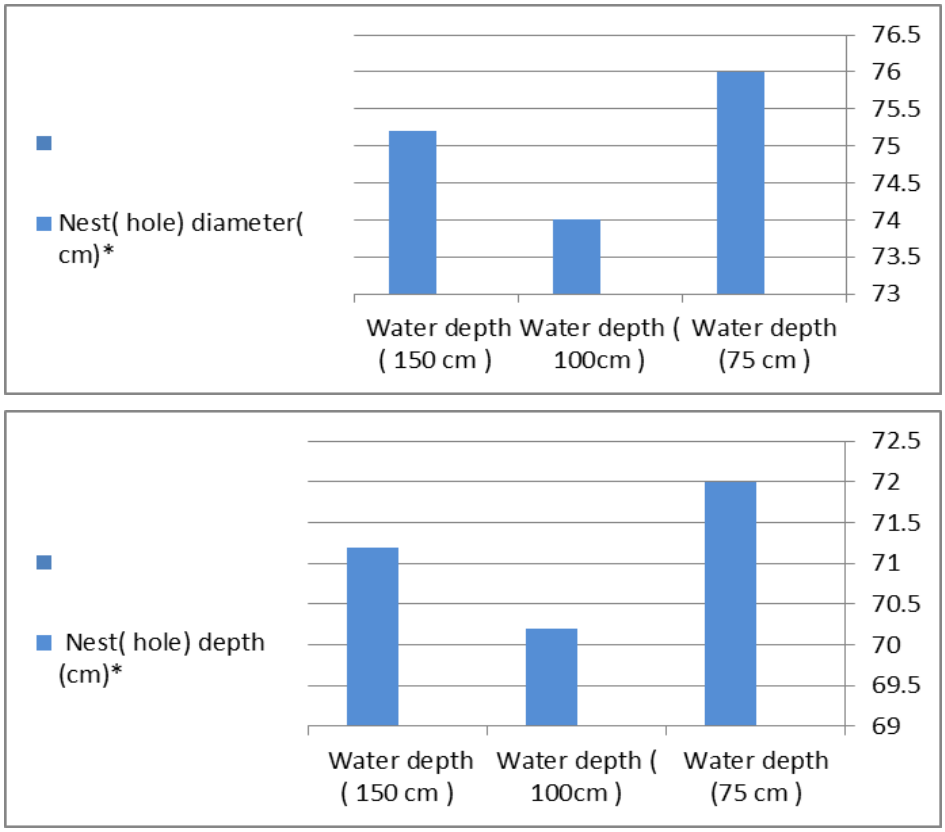

Fig (2): Nest diameter and depth.

Fig. (3): Mean number, body weight and body length of seed

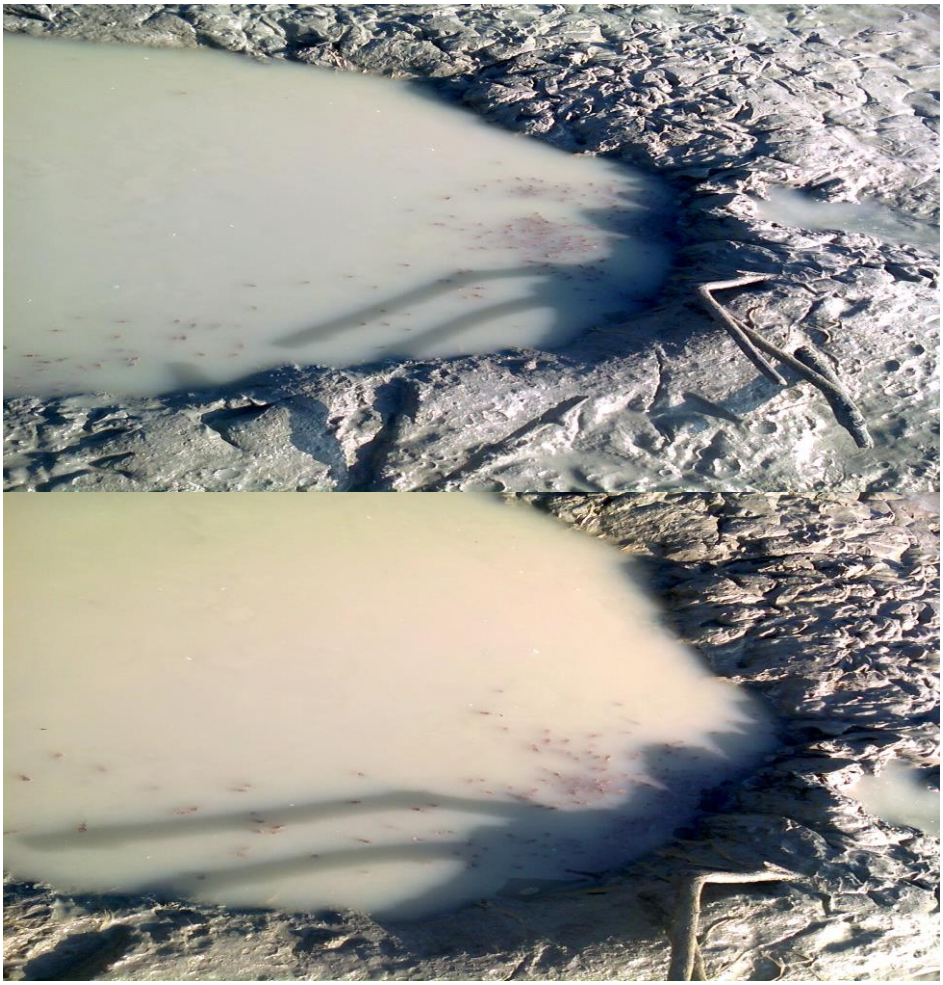

Fig. (4): B. bayad fry in Nest.

Fig. (5): B. bayad fingerlings in aquarium.

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محاولات لإنتاج ذريعة اسماك البياض في الأحواض الترابية باستخدام مستويات مختلفة من المياه لأول مرة في جمهورية مصر العربية

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الملخـــــص العربـــــى

تم عمل دراسة لتقييم إنتاجية ذريعة اسماك البياض من أمهات أسماك البياض عمرها ٣-٤ سنوات ومتوسط أطوالها ٥٢.١±٠.٦ ، ٥٤.٢±٠.٤ ، ٥٤.٨±٠.٥ سم علي التوالي عند ثلاث مستويات من المياه هي ٧٥ سم ، ١٠٠ سم ، ١٥٠ سم .

تمت التجربة في أحواض ترابية ١٠٠٠ م٢ واستمرت التجربة ٩٠ يوم وكانت الأسماك تغذي ٦ أيام من كل أسبوع ودرجة حرارة المياه كانت ٢٢ – ٢٤ م .

وكانت النتائج كما يلي :

الإنتاج من الذريعة / حوض كان (في المجموعة الأولي ٢٨٢٨٠± ٣٧٩.٥ ، في المجموعة الثانية ٥٣٤٩٦± ٤٢٧.٩ وفي المجموعة الثالثة٥٣٨٦٦.٤± ٣٤٥.٧)، ومتوسط عدد الذريعة / أم (في المجموعة الأولي ٥٦٥٦.٠ ± ٢٧٣.١ في المجموعة الثانية ١٠٦٩٩.٠ ± ٤١٥.٨ وفي المجموعة الثالثة ١٠٧٧٣±٤٢٥.٢)

الخصوبة النسبية (في المجموعة الأولي ٥.٦± ٠.٢ وفي المجموعة الثانية ١١.٢±٠.٤ وفي المجموعة الثالثة ١١.٣ ± ٠.١) كانت كل هذه النتائج ذات معنوية مرتفعة في المجموعة الثالثة عن المجموعة الأولي وكانت الاختلافات غير معنوية بين المجموعة الأولي والمجموعة الثانية بينما كان حجم العش (القطر – العمق) كان ذات معنوية مرتفعة في المجموعة الأولي (٧٦.٠ ± ١.٣ ، ٧٢.٠ ± ١.٤) عن المجموعة الثانية (٧٤.٠±٢.١ ، ٧٠.٢ ± ٢.٠) ولكن الاختلافات كانت غير معنوية بين الأولي والثالثة (٧٥.٢ + ٣.٦ ، ٧١.٢ + ١.٦) كذلك لم توجد اختلافات معنوية بين المجاميع المختلفة في وزن وطول الذريعة .