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Original Research Article

Technical feasibility study of the intensive semi breeding of the tilapia (*Oreochromis niloticus*) at the level of the station of fish farming of Deroua (Benimellal / Morocco

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A B S T R A C T

The present work concerns the technical feasibility study of the semi-intensive breeding of Tilapia from the Nile to Morocco at the level of the station of Déroua in 2007. It has for objective to put at the disposal of the promoters of this type of fish farming in particular, the National Center of Hydrobiology and Fish farming and the private of the information on the biological bases of the breeding of this species. The parents of tilapia of the Nile who were of use to the experiment result from the stock of the station of Déroua (Beni Mellal Morocco). The method of used reproduction is the reproduction hapas. The proportion of females having laid is about 80 % and the fertility absolved from females is on average 2000 eggs. Determined from the meditative data, the relation enters on one hand the absolute fertility and the weight and on the other hand between the absolute fertility and the size of fishes are respectively (F = 27,85 .P 0, 731) and (F = 1,103. L 2, 294). The rate of survival of alevins is 92,7 % at the first stage , 97 % at the second stage and 99,19 % at the third stage.

Keywords

Tilapia of the Nile;
the breeding;
hapas;
relative fertility;
rate of survival;
alevins;
Morocco.

Introduction

In 2010, the peaches of capture and the fish farming produced approximately 148 million tons of fish in the world among which 128 million approximately tons for the human food (supply), the preliminary data show that the production increased in 2011, affecting 154 million tons, among which 131 million tons intended for the food(supply) (FAO, on 2012). In Morocco, aquacultural production in

affected an average of 300 tons / years these last four years, the objectives of the plan HALIEUTIS, in terms of production volume, aspire to reach 200.000 tons a year the horizon 2020 (ANDA, on 2010), what will allow to make cross the exports of the halieutic products of 1, 2 Mrds $US in 2007 to 3,1 Mrds $US in 2020. Between 2001 and 2005, the fish production reached a maximal value of 1450 tons, this maximal production fell further to the closure of a production unit called Marost (FENIP-9 2010). At present, and according to the National Agency of Halieutic Development, the potential marine sorts(species) which can be the object of breeding in Morocco are the wolf bar *(Dicentrarchus labrax*) and Sea bream (*Sparus aurata*) the sole (Solea solea) and Thin (*Argyrosomus regius*), on a national scale the number of operator in the field of breeding is of the order of 22 among which 20 for oysters, one for molds(mussels) and one for fish (FENIP, 2010).

For freshwater fish, besides the trout rainbow raised in Ain Aghbal to Azrou who produces the 100Tonnes / year and the red Tilapia (1000 tons / year), produced by Fish farming of the North of the group Sea Food (FENIP, 2010), the Tilapia of the Nile (*Oreochromis niloticus)* is a species introduced by Egypt in 2004, its breeding is among others made at the level of the station of fish farming of Deroua to Beni Mellal. Cette species can be of a major importance in the development of the aquacultural potential of Morocco (CNHP, 2004). The present work handles the biology of reproduction of this species (Oreochromis niloticus) at the level of the station of Deroua being of the HCEFLCD during year 2007.

Materials and Methods

Présentation of the station of Deroua

The fish station of Deroua is at a height of 428 m, it is situated in the artificial state-owned forest of Pine and Eucalyptus of Deroua in 20 km in the Southwest of the city of Beni Mellal (Morocco). His geographical coordinates are 32 ° 20 ' the North and 6 ° 45 ' the West. The ponds of the station of Deroua base on a brown ground subtropical isohumique developed on an argilo-calcareous deposit of the average Quaternary. The fine texture of the lower horizons confers to this type of ground a good retention of waters (Droussi, on 1999). The number and the total surface of the ponds of production of alevins and parents at the level of the station Deroua are distributed as continuation: 16 ponds of fish farming among which 12 have a surface of 2000 m ² and among which 4 measure 1500 m ² and 16 ponds of storage of the parents of 200 m ² each. The pond used for the installation of hapas (kind of open cage from above) of reproduction and fish farming is the pond B4. The latter belongs to the series of the ponds of fish farming and swelling of the station of Deroua (figure) 3) .C' is a pond about 2000 m ².

Biological materials

Preparations of the parents

Once sins by sennage in ponds, the chosen parents are sorted out to separate the males of females then these parents are guarded separately during a week for the stalling. The placement of the parents in hapas is made in two stages according to the recommendations of the manual worker of WORLD FISH CENTER (2004).

In first stage, and after stalling, the mature females are respectively measured (size and weight) before being placed in hapas with a density of 2/hapa. To distinguish every female in hapas, one of the females is marked by a woolen thread inserted into the dorsal fin. And eighty installed hapas are all numbered.

Recovery of eggs and incubation

Two weeks after their stay in hapas, and as the Tilapia of the Nile is an oral incubator, the harvest of eggs was made directly in the mouth of females, and then, collected eggs are transferred to the hatching for incubation in incubators (bottle of Zoug). After hatching, alevins are got back in aquariums of first fish farming before being transferred in the hapas of fish farming.

Estimation of number of eggs and alevins

The determination of the fertility requires the determination of number of eggs by heavyweight to the tilapia, to do it, after the recovery, eggs are immediately displayed over a flat surface and we count them by means of a graph paper. Knowing that in a cm ² we have approximately 40 eggs. This estimation was determined to the station of Deroua on the basis of several measures which we made on one of the eggs resulting from various females. For alevins, they left in the aquarium which has a known volume; samples are taken with a bowl of volume so known. Every time the number of alevins in the bowl is counted before putting back them in the aquarium for a new taking. The average is calculated on three or four tests. From this average we determine by the rule of three the number which contains the aquarium while considering the error of the taking.

Estimation of success rate in the various stages of fish farming

To determine the success rate of some phase of cycle of development of tilapia of the Nile, ovules resulting from 25 females are estimated and placed in incubators, after hatching, alevins before the reduction of their vitelline vesicle are placed in the aquariums of first fish farming in the hatching to affect the size of 1cm before their transfer in the hapas of fish farming. These alevins estimated at 40500 are a part of alevins intended for the masculinizing by treatment hormonal in 17α Methyltestosterone, a stay in aquariums allowed them to become used to the food which is distributed to them for the inversion of sex. The rate of survival of alevins at this stage is determined by the relation:

TSA 1 = (Nr / not) x 100 with: TSA: rate of survival of alevins at the first stage and Nr: number of alevins after the reduction of vesicle vitelline and Not: number of alevins in the hatching.

Results and Discussion

On a total of 428 quite old mature females in most than year used during the study, the smallest observed mature female is 18 cms long and weighs 113 g.

The first layings were observed 15 days after the implementation of the parents in hapas. The delay observed (10 days) is understandable by the temperature which did not reach the required level (22 in 24°C). The layings were observed when the temperature increases constantly and does not come down any more below 20°C.

To the females which are placed on

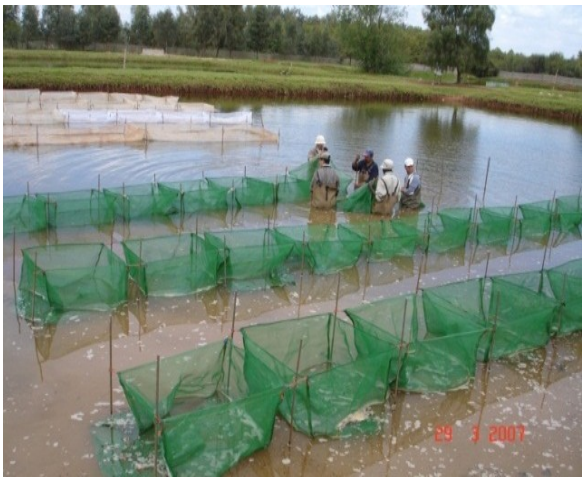
01/05/07, having got back the first alevins stemming from the first reproduction, the first layings were observed on 09/05/07 that is 7 days later set up to them. Meanwhile, the temperature evolved of 24 in 27°C. The first layings of the parents placed on 08/05/07 under the greenhouse in hapas of 12 m ² with a report of female/male (mate) of 3/1 and in a temperature varying 27 in 32°C, were observed on 11/05/07. This confirms the results of Melard (1986) on the length of stay before the first laying which is all the shorter as the temperature is raised. For the first essay of reproduction of 06/04/07 in hapas, 72 % of females have, during the second essay of reproduction, the implementation of the parents in hapas took place on 01/05/07, after two weeks of stay the proportion of females having laid is 82 %, this increase of reproductive female is understandable by ideal temperatures of the reproduction during June, this optimal temperature of reproduction of Tilapia in the station of Deroua would be superior 24 °. The hatching took place at the level of hapas, four days after the laying in a temperature which varies between 22 and 24°C, between 20-22°C the hatching is made one week, the time of incubation decreases in 2 days when the temperature achieves 30°C. What shows that the time of incubation is also influenced by the temperature. According to (Moreau, 1979), the fertility fluctuates strongly at the tilapia, at the level of the station Déroua, the absolute fertility varies between 400 and 4600 ovules for weights going respectively 105 g to 550 g. The fertilities absolved according to the classes of sizes are determined for a total of 101 females (Tableau1). The absolute fertility is proportional in the size of the fish (Lazard and Legendre, 1996) (Figure) 2), this result was already quoted by other authors (MELARD; on 1986) and (Babiker and Ibrahim, 1979) in natural environment. The relation between the absolute fertility and the weight of the fish (Figure) 3) is of type: f = 27,85 .P 0, 731 (log F = 0,731 log P + log 27,85); with a standard error of the coefficient of regression is 1,17. The same type of equation is obtained by Melard (1986) (f = 38,291. P0, 672 n = 113 with a standard error of the coefficient of regression is 0,030).

For the rate of survival in the various stages of fish farming (Table 2), the most sensitive stage to the alevins of tilapia is the one observed between the hatching and the reduction of the vesicle vitelline, because alevins have to learn to consume the food distributed before the complete reduction of their vitelline vesicle and which varies according to the temperature (Melard, 1986).). The rate of survival of alevins at this stag is 92,7 %. The 7,3 % mortality is due to the physical disturbances which know alevins about this stage (siphonage, travel movement) of alevins of incubators in aquariums), at the second stage, at the size of 10 mm the rate of survival is 97 %, the 3 % mortality is understandable by a loss bound (connected) to the stress caused by the movement of the alevins of the hatching towards the hapas of fish farming placed under the greenhouse with conditions which deferential of those of the hatching. This reduction of mortality at the second stage is also understandable by the fact that alevins become more resistant in the manipulations. For the third stage. The survival affects 99, 19 %. During this stage alevins knew no manipulation and they enjoy a more important living space and optimal conditions of growth. Since their movements in the hapas big of fish

Table.1 Variation of the fertility absolved with the length of the fish

lass of length (Cm)	Number of fishes	Relative fertility % ± IC95%	Absolved fertility averages± IC 95%
18-19,9	4	5,3 ± 0,5	988 ± 165
20-21,9	18	4,8 ± 1,4	1353 ± 303
22-23,9	30	4,4 ± 1,2	1474 ± 316
24- 25,9	14	3,9 ± 0,9	1578 ± 244
26-27,9	15	3,9 ± 0,6	1993 ± 413
28-29,9	15	3,9 ± 1,1	2136 ± 433
30-31,9	2	4,1 ± 0,9	2950 ± 141
32-33,9	3	4,2 ± 0,08	3167 ± 305

Figure.1A Hapas of reproduction (1m×1m×1m and B: hapas of fish farming (6m×2m×1m²)



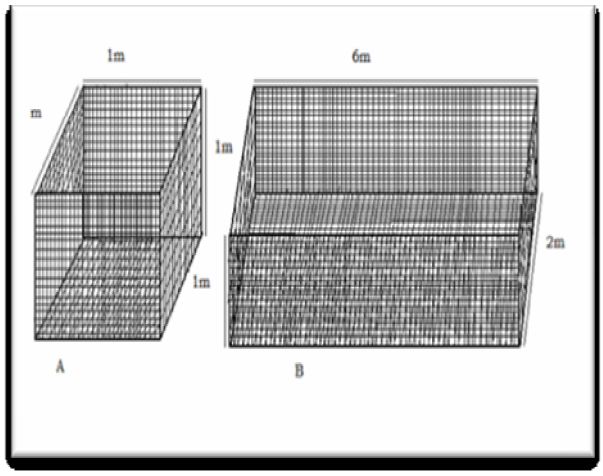


Table.2 Rate of survival according to the various stages of alevin

Stages	first stage	second stage	third stage
Time (days)	1-5	6- 15	15- 40
Size	200µm	0,5-10mm	10 mm-1cm
Rate of survival of alevins	92,7%	97%	99,19%

Figure.2 Relation between the absolute fertility and the length of the body (cm)

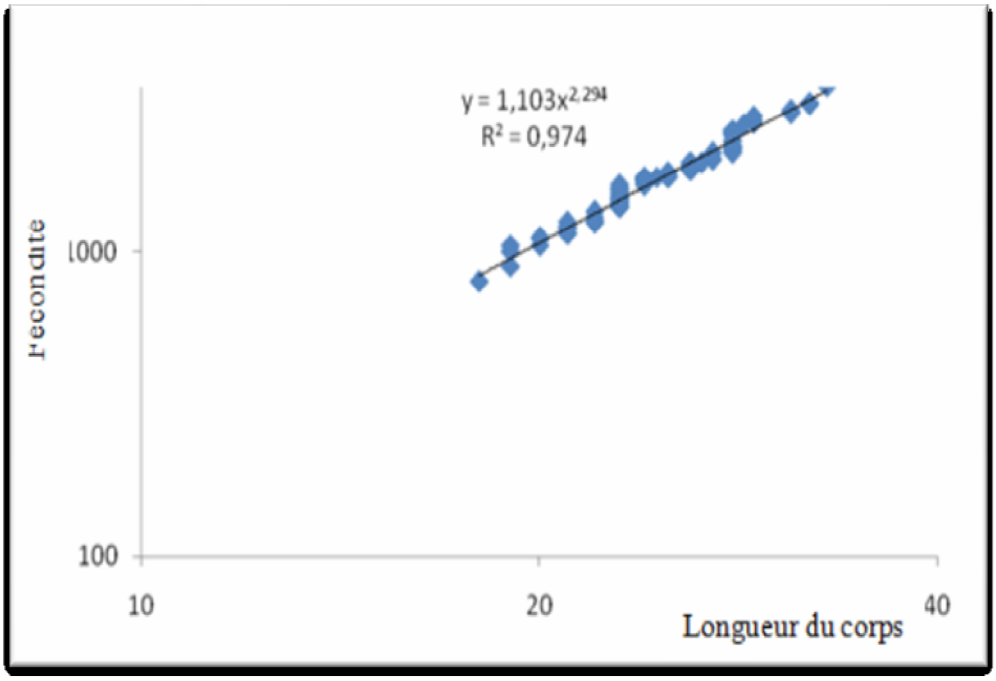
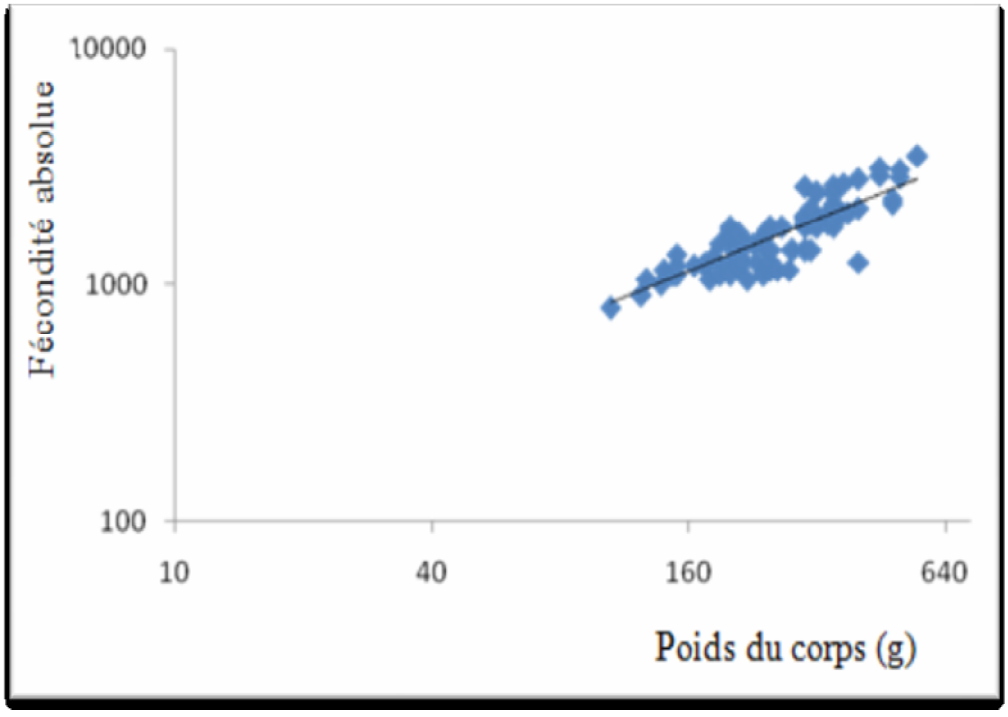


Figure.3 the relation between the absolute fertility and the weight of the body to the Tilapia of the Nile



farming under greenhouse, the temperature which plays an important role (Boyd and Tucker, 1998) was always superior in 28°C.

References

ANDA, 2010. Agence Nationale pour le Développement de l'Aquaculture.Une nouvelle ère pour l'aquaculture au Maroc.

Babiker, M.M., and. Ibrahim, H. 1979. Studies on the biology of reproduction in the cichlid Tilapia nilotica (L.): Gonadal maturation and fecundity. J. Fish Biol. 14: 437-448.

Boyd, C.E., and et Tuckers. C.S., 1998. Pond aquaculture water quality management. Boston Dordrecht London: Kluwer Academic Publishers,: 700 p.

Droussi, M., 1999 **.**Technique de la reproduction artificielle de la carpe chinoise.

FAO, 2012. La situation mondiale des pêches et de l'aquaculture.

FENIP, 2010. Fédération Nationale des Industries de transformation et de valorisation des produits de Pêchesau prêt de la CGEM. Etude de l'état des lieux de l'aquaculture au Maroc et identification des marchés aquacoles cibles et de leurs conditions d'accès

Lazard , J. and. Legendre, M . 1996. La reproduction spontanée du tilapia : une chance ou un handicap pour le développement de l'aquaculture africaine? p. 82-98. /n R.S.V, Pullin, J. Lazard, M. Legendre, J.B. AmonKothias et D. Pauly (éds.) Le Troisième Symposium International sur le , Tilapia en Aquaculture. ICLARM. Conf. Proe. 41, 630 p.

Melard, Ch., 1986. Recherche sur la biologie *d'Oreochromis* (*Tilapia) niloticus* L. (piscies Cichlidae) en élevage expérimental: reproduction, croissance, bioénergétique. Thèse de doctorat en Sciences Zoologiques, Université de Liège, 192 pages.

Moreau, J., 1979. Biologie et évolution des peuplements de Cichlides (Pisces) introduits dans les lacs malgaches d'altitude. Thèse de Doctorat d'Etat n°38, Institut Polytechnique de Toulouse, 301 p.

Rapport (CNHP). 2004. Centre National d'Hydrobiologie et de Pisciculture**.** Rôle dans le développement de l'aquaculture continentale et la conservation de l'environnement aquatique.

World Fish Center , 2004. Gift technology manual and aid to Tilapia selective breeding.pp.45.