

The possibility of growth of North African catfish (*Clarias gariepinus*) in Romanian natural ponds during summer period

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Abstract. In this paper the authors want to point out the possibility of growth of a recently entered species in Europe, the North African catfish (*Clarias gariepinus*), and especially to show that this species can be exploited during the warm season in natural ponds. The experiment was conducted on a fish farm located in Cehu Silvaniei, Salaj County, with a duration of 55 days and considering 235 individuals, aiming to highlight the development of growth dynamics expressed by the accumulation of total body mass and average daily gain. Supplementary feeding was performed using pelleted feed with a protein level of 45 % and 6.5 % fat. Beside the supplementary food the biological material had available natural food as well, existing in basins. In the experiment we have demonstrated the viability of this research approach, and the results confirm the possibility of North African catfish growth during the warm season in natural basins in Romania.

Key Words: North African catfish, *Clarias gariepinus*, natural ponds, growth, weight gain.

Rezumat. În această lucrare autorii doresc să releve posibilitatea de creștere a unei specii noi, pătrunse recent în Europa, somnul african (*Clarias gariepinus*) și mai ales să demonstreze că această specie poate fi exploatată pe durata sezonului cald în bazinele naturale. Experimentul s-a desfășurat într-o exploatație piscicolă din Cehu Silvaniei, Jud. Sălaj pe durata a 55 de zile și pe un efectiv de 235 de exemplare, urmărindu-se evoluția dinamicii de creștere, exprimată prin acumularea totală de masă corporală și sporul mediu zilnic. Hrănirea suplimentară s-a făcut cu furaj granulat cu un nivel proteic de 45 % și 6.5 % grăsime. Pe lângă hrana suplimentară somnul african a beneficiat și de hrana naturală existentă în bazinul de creștere. În urma experimentului s-a demonstrat oportunitatea abordării acestei cercetări, iar rezultatele obținute confirmă posibilitatea de creștere a somnului african pe durata sezonului cald în bazinele naturale din România.

Cuvinte Cheie: Somn african, *Clarias gariepinus*, bazine naturale, creștere, acumulare de masă corporală.

Introduction. Fish and other aquatic organisms are a valuable and important nutrition source of a fundamental diet, and is diverse and healthy (Todoran & Bud 2013; Ipinjolu et al 2013), therefore there is also concerns in increasing of fish meat production (Crișan & Bud 2013). Fish meat, regardless of species considered contains many important nutrients, including proteins of high biological value that should constitute a major segment of our daily food, consider most of nutritionists (Vivien et al 1986).

The total amount of consumed fish and the chemical composition of fish varies from one country to another or from one region to another, reflecting different levels of availability of fish based on the one hand on access to the fishing resources, and on the other hand of tradition, religion and economic potential (Bud et al 2007).

In recent years both the consumption of fish and other aquatic organisms and the diversity of products has been improved substantially as a result of complex interactions which have made these changes, such as:

- the significant growth of population;
- significant growth of the economy and income increase;
- fast growing urbanization;
- improvement of selling price and quality standards;
- processing and products diversification;

- continuously increased demand for aquatic products;
- significantly improved of overall technological performances, logistics and transport, storage and presentation.

According to statistics presented by F.A.O consumption of fish and other aquatic organisms had in the last 40 years an increasing trend per capita from 9.9 kg in 1960 to 11.5 kg in the 1970s, from 12.6 kg in 1980 to 14.4 kg in 1990, and reached 18.4 kg per capita in 2009.

Some new species of fish that entered the Romanian fish market include tilapia, North African catfish, and American paddlefish, have won more or less consumers appreciation, some of which are still in testing, but all appreciated for quality and diversity (Bud et al 2010; Clay 1979).

Given the low level of knowledge of both consumers and professionals, regarding the biology and the peculiarities of North African catfish, we thought it is appropriate to conduct an experiment to reveal the possibility of growth of this species in natural basins in Romania during summer period, when the water temperature rises to the optimal requirements of the species.

Material and Method. So far information on this species are sporadic and very brief, reason for which we proposed a very extensive and summary study of which in this paper we present the results of North African catfish growth in Romania, in natural ponds, during summer. The research was conducted at S.C. Piscicola Cehu Silvaniei S.R.L, in Salaj County, a farm specialized in cyprinids breeding. The fish farm stands among the leading manufacturers of freshwater fish producers in North West Romania (Figure 1).

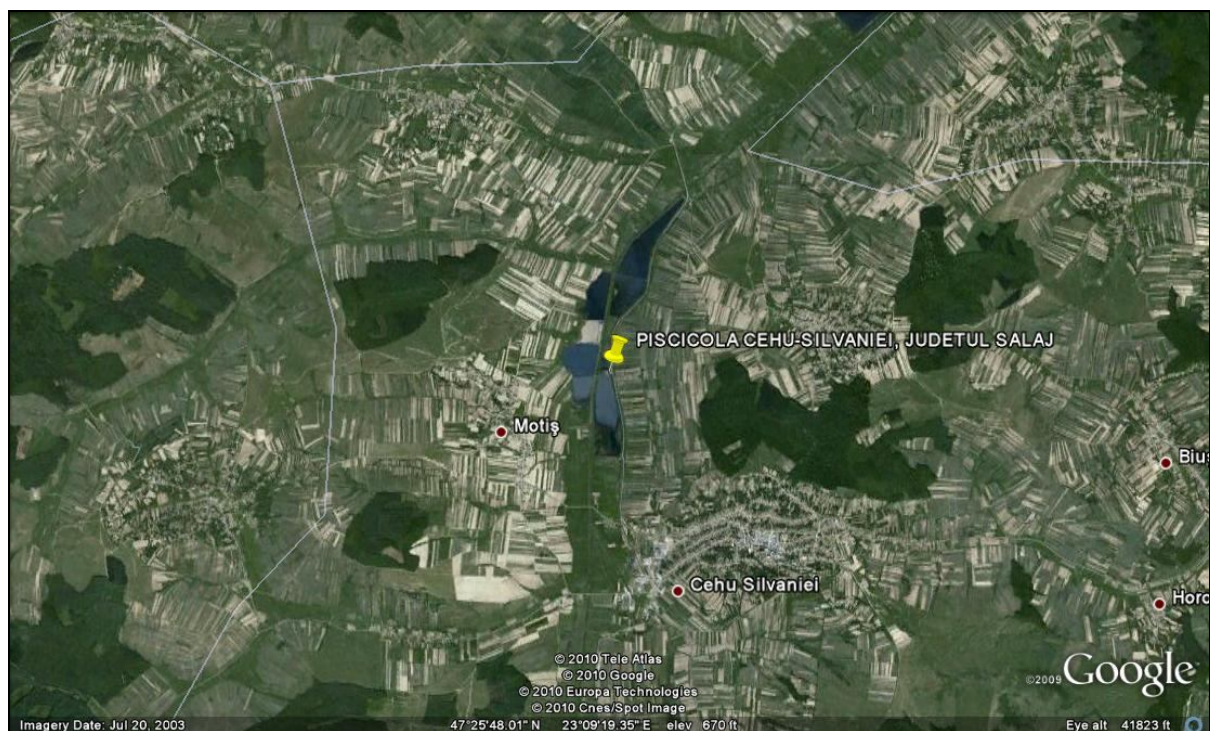


Figure 1. Geographical localization of S.C. Piscicola Cehu Silvaniei S.R.L. (detail).

The biological material used in this experiment was represented by 235 individuals of North African catfish (*Clarias gariepinus*) originated from S.C. Clarias Com Ltd, the only firm which rear this fish species in our country.

The purchased specimens were installed in a pond with an area of 440 m², a depth of 0.9 to 1.0 m with a water temperature of 22.1 °C, temperature in respect with the comfort limits for this species (Figure 2).

The research was conducted over 55 days, from 17.07.2007 till September, following the way of adaptation to the new medium, the growth dynamics expressed in the accumulation of total body weight, average daily gain and the development of main body segments.



Figure 2. Experimental pond.

Supplementary feeding of the fish was performed with pelleted fodder, having a chemical composition identical to that used in the superintensive growing system, with a protein level of 45 %, and 6.5 % fat.

The body weight at installation was an average of 444.01 ± 15.33 g with a coefficient of variation of 29.29 %. The most important morphological features were also registered, performing 10 body segments measurement.

Results and Discussion. Following research and the obtained results during the experiment the following most significant aspects were revealed that we will present below (Table 1).

As a first aspect to be highlighted is the fact that during the 55 experimentation days was achieved a total body mass accumulation of 486.67 ± 18.25 g, from 444.01 ± 15.33 g reaching to 930.68 ± 32.14 g.

Following the growth performance achieved, the weight was doubled in that time, so we can say that it is proposed that this species can be successfully grown in our country during the summer in natural basins in the interval between June and September, approx. 120 days.

During the experiment food was given in respect on the one hand with the weight and on the other hand, with the temperature of the water so that it represented 3.1 % of body weight till 500 g, 2.35 % from 500 g to 800 g , and 1.8 % of body weight over this values.

We also considered the amount of zooplankton from the basins that contributed to the achieved performances. The importance of this valuable food source should be not neglected, and can be assured only through a healthy ecosystem by a conscious anthropic intervention (Popa & Bud 2011). Otherwise by negligence or accidental deterioration of the environmental conditions “especially following acute pollution of aquatic organisms, is producing shocks, which are affecting parts of or all trophic structures, so the result is a decrease in aquatic ecosystems’ diversity, critical for populational survival” (Popa & Bud 2010). Research conducted on fingerlings regarding acute toxicity of some common detergents concluded that these cause respiratory disturbances, loss of righting balance, lethargy and sudden death (Ndome et al 2013).

Table 1

The average and dispersion indices of the physical characteristics of the North African catfish (*Clarias gariepinus*) population, at installation and harvesting

Specification	Unit	N	$\bar{X} \pm s_{\bar{x}}$		Standard deviation (s)		Coefficient of variation (V %)	
			At installation 17.07.2007	At harvest 10.09.2007	Installation	Harvest	Installation	Harvest
BW	g	75	444.01 ± 15.33	930.68 ± 32.14	132.82	278.35	29.91	29.9
Difference			486.67 ± 18.25					
TL	cm		36.13 ± 0.40	47.65 ± 0.58	3.48	5.03	9.63	10.55
Difference			11.52 ± 0.68					
SL	cm		31.46 ± 0.35	41.70 ± 0.51	3.09	4.39	9.83	10.52
Difference			10.24 ± 0.15					
LH	cm		9.53 ± 0.12	11.77 ± 0.15	1.02	1.31	10.68	11.12
Difference			2.24 ± 0.16					
PdL	cm		11.20 ± 0.13	13.85 ± 0.17	1.16	1.46	10.32	10.54
Difference			2.65 ± 0.17					
PaL	cm		17.79 ± 0.21	23.37 ± 0.28	1.79	2.45	10.07	10.48
Difference			5.58 ± 0.09					
LCP	cm		4.66 ± 0.08	5.95 ± 0.10	0.66	0.85	14.05	14.28
Difference			1.29 ± 0.08					
H	cm		4.29 ± 0.06	6.29 ± 0.08	0.54	0.72	12.48	11.44
Difference			2.00 ± 0.05					
h	cm		2.91 ± 0.04	3.35 ± 0.06	0.33	0.49	11.46	14.62
Difference			0.44 ± 0.06					
TP	cm		18.07 ± 0.19	21.01 ± 0.27	1.67	2.31	9.27	10.99
Difference			3.03 ± 0.17					

N – Number of samples, BW - Body weight, TL - Total length, SL - Standard length, LH - Length of head, PDL – Pre-dorsal length, PaL – Pre-anal length, LCP - Length of caudal peduncle, H - Maximum height, h - Minimum height, TP - Thoracic perimeter.

Regarding the total accumulation of body weight, average daily accumulation was performed on this interval on averaged of 8.848 ± 0.45 g, which we consider very favorable and it gives us the assurance that in our country in the future the North African catfish will be grown on a wider scale (Table 2).

Table 2

Accumulation of total body weight (BWG) and average daily gain (ADG) in North African catfish (*Clarias gariepinus*) growth in natural basins

Specification	Body weight gain (BWG) (g)	Average daily gain (ADG) (g)
Measurements interval (days)	55	55
Mean \bar{X}	486.67	8.848
Standard error of mean $s_{\bar{X}}$	18.25	0.45

Analysing the main body dimensions of biological material during the experiment we can make some considerations as follows. Thus we find that of the 10 body size studied to see the evolution of body conformation, the total length recorded the highest difference (11.52 ± 0.68 cm), followed by the standard length with a difference of 10.24 ± 0.15 cm. In contrast, the smallest growth evolutions were recorded for the minimum height of the body, a difference of less than one centimeter, in particular 0.44 ± 0.06 cm, at the length of the caudal peduncle the difference was only 1.29 ± 0.08 cm, and at last, the maximum height increased only with 2.00 ± 0.5 cm. Following these body segments increases during the almost two months, conformation did not change significantly, except for the two lengths.

Conclusions. Following research and obtained results several significant conclusions can be highlighted.

The North African catfish lends itself easily for growth in natural ponds but only if the water temperature exceeds 20 °C.

Growth performance in terms of body weight accumulations, and average daily gain are relatively high, which leads to increased fish yields and saving costs related to supplementary feeding.

The administered supplementary feed should have a high protein content, preferably more than 40 % and more than 6 % fat, given in accordance with the temperature of the water, the body weight and nutritional base of the basins.

Given to the external temperature evolution, and of basins water temperature in lowlands and hills, we believe that exploitation of North African catfish can be performed between June and September, approximately 120 days, period in which can be achieved a total body weight gain of approx. 1.0-1.2 kg.

In order to grow North African catfish in our country's climate very precise investigations are necessary, regarding temperature evolution during the year to establish as accurately as possible the time of insatiation, growth period (duration), and time of harvest. Any environmental changes (e.g. temperature) can reduce the resistance of organism against inevitable disease that occurs in a fish farm (Csépi et al 2010).

As a final conclusion we can admit that North African catfish may be an alternative to fish farming in natural ponds, which can lead to a diversification of species provided to the consumers.

References

Bud I., Vlăduț V. V., Ștefan R., 2007 [Predatory fishes – growing, breeding, capitalization]. Ceres Publishing House, Bucharest, Romania. [In Romanian].

- Bud I., Vladau V. V., Nadasanu M., 2010 [Treatise for fish farming]. Texte Publising House Cluj-Napoca, Romania. [In Romanian].
- Csép L., Bud I., Chirilă F., 2010 Disease resistance effect of sea-buckthorn (*Hippophae rhamnoides* L.) added in the fish diet. AACL Bioflux 3(5): 339-346.
- Clay D., 1979 Sexual maturity and fecundity of the African catfish (*Clarias gariepinus*) with an observation on the spawning behaviour of the Nil catfish (*Clarias lazera*). Zoological Journal of the Linnean Society 65(4): 351-365.
- Crîșan V., Bud I., 2013 Possibilities to restore the quality of mountain waters and increase fish production. ABAH Bioflux 5(1): 80-86.
- Ipinjolu J. K., Abubakar M. Y., Magawata I., Buko M. I., 2013 Reproductive, survival and growth performance of intergeneric cross of Exotic Dutch *Clarias*, *Heterobranchus bidorsalis* and *Heterobranchus longifilis* in Sokoto North-West Nigeria. AACL Bioflux 6(6): 571-581.
- Ndome C. B., Mowang D. A., Ayibaemi T. T., 2013 Comparative acute toxicity of local detergents (Omo and Ariel) on fingerlings of the *Clarias gariepinus*♀ x *Heterobranchus longifilis*♂ hybrid. AACL Bioflux 6(4): 415-420.
- Popa G., Bud I., 2011 Significant punctiform and diffuse pressure in upper Crasna river basin. AACL Bioflux 4(2): 108-122.
- Popa G., Bud I., 2010 The qualitative assessment of Crasna River in terms of Water Framework Directive 2000/60/EC and Directive 78/659/EC. AACL Bioflux 3(2): 103-117.
- Todoran L., Bud I., 2013 Opportunities to improve the quality of aquatic products. ABAH Bioflux 5(2): 156-164.
- Vivien W. J., Richter C. I., Janssen J. A., Van O., Ordt P. G., Huisman E. A., 1986 Practical manual for the culture of the African catfish (*Clarias gariepinus*). Departament of Fish Culture and FISERIES of the Agricultural University of Wageningen the Netherlands, 121 pp.

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