Comparison of growth performances of the Niger and Bouaké strains of *Clarias anguillaris*

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Introduction

Clarias anguillaris Linnaeus, 1758 is a teleost fish of the Clariidae family. It belongs to the subgenus *Clarias* (*Clarias*) which has another species of considerable interest to aquaculture in Africa: *Clarias gariepinus* Burchell, 1822 (*Syn.*: *Clarias lazera* Valenciennes, 1840). The only difference between these two species is the number of branchiospines on the first branchial arch which is greatly reduced in *C. anguillaris* : 16-50 *versus* 24-110 in *C. gariepinus* (TEUGELS, 1992).

Clarias anguillaris is also of interest to aquaculture (VOLCKAERT *et al.*, 1994). This species is used in aquacultural production systems in Africa (SYLLA, 1994). In fact, it is often used in aquaculture in place of *Clarias gariepinus* because of the close resemblance with the latter. Because of its wide distribution, it is necessary to study growth performances of this species. The current study uses two strains of *C. anguillaris* : those of Bouaké and the Niger River.

Materials and Methods

Fish from Niger River were brought to the Idessa (l'Institut des Savanes) aquacultural station in May 1993 by the CRO (Centre de Recherches Océanologiques) of Abidjan. This wild population, made up essentially of juveniles, was raised to sexual maturity. Then, a systematic identification was made and a stock of *C. anguillaris* brooders was created. *Clarias gariepinus* was excluded because of the insufficient numbers of brooders. The Bouaké strain of *C. anguillaris* was choosen from the adult stocks available at Idessa and coming from the Loka farm of the rural aquacultural development project.

Artificial reproduction was carried out at the CRO in August 1995. The sex ratio used was 3:3 for each strain. Oocyte maturation was induced using HCG at a dose of 1500 IU/kg of live weight. Two females ovulated for the Bouaké strain and only one for the Niger strain. The egges from each female were kept in separate plastic containers. The *C. anguillaris* Niger sperm was collected and cryopreserved for a period of six months beforehand. That *of C. anguillaris* from Bouaké was collected after sacrificing the males.

The milt was mixed by strain and diluted in physiological serum. An equal weight of ovules (7.5 g) from each of the ovulating females was fertilized with 11.25 ml of diluted sperm. After rinsing with water, the eggs were incubated in sieves previously placed in 220 l tanks at 30°C.

From hatching, the fry were fed intensively with decapsulated *Artemia salina* eggs for two weeks. Fingerlings of mean weights ranging from 0.633 and 0.733 g for *C. anguillaris* Niger and between 0.413 and 0.633 g for *C. anguillaris* Bouaké were transfered to Idessa for pre-grow out, which lasted two months. According to the VIVEEN *et al.* (1985) feeding chart (table 1), the fingerlings were fed with crumbled feed M2GE (table 2) made by Fabrique d'Aliments de Côte d'Ivoire (FACI),

Weeks	1	2	3	4	5	6	7-12	13-20	21-24
Mean weights (g)	1	3	6	10	15	19	24-55	62-140	160-200
feed ratio (%)	25	10	7	4,5	4	3,5	3	2,5	2

Table 1
Feeding chart for the intensive culture of *C. gariepinus* in ponds (Pelleted feed with 30% protein) (Viveen *et al.*, 1985)

The growth trials of the Niger and Bouaké strains of *C. anguillaris* was carried out in a series of 15 m3 concrete tanks with a usable water volume of 11.2 m3. The water flow through these structures was 0.14 l/s. The assignment of tanks was random, with 3 tanks per strain. The tanks were stocked with fingerlings at a density of 30 individuals per tank, 2.7 fish per m3. The mean weight at stocking varied between 51.08 and 54.37 g for *C. anguillaris* Niger and between 55.17 and 55.46 g for *C. anguillaris* Bouaké .

Ingredient	%
Crude protein	45
Crude fat	5
Crude fiber	4.5
Calcium	1.5
Phosphorous	1
Na	0,7
Vit.A	9.000 UI/kg
Vit.D3	1.200 UI/kg
Vit.E	50 mg/kg
Vit.B1, 2, 3, 6, 12	100 mg/kg
BHT	
Lysine, methionine	

Table 2
Composition of the Faci feed M2GE.

The fish were fed with the Faci feed M2GE (table 2) in pelleted form at 45% crude protein. The same feed ration was distributed to all fishes. This corresponded to 3% of the highest mean weight observed in the different populations, all strains included. Growth measurements and the adjustment of the feed ration were carried out after each monthly samplings. All fishes were weighed and measured individually. At draining, the same morphometric measurements were taken. Survival rates were noted. The temperature in the experimental tanks ranged on the average between 24 and 28.8°C.

The analysis of the variance of the culture parameters was carried out with an Anova (single classification) for samples of equal or unequal sizes, and the TUKEY-KRAMER test for mean pairs comparison for unequal sample sizes (SOKAL et ROHLF, 1995).

Résults and discussion

The growth performances of the Bouaké and Niger strains of *C. anguillaris* were compared during the grow-out phase. Results are presented in Figure 1.

The juvenile populations of the two strains used for stocking the experimental tanks had similar weights ($p>0.05$ and $p>0.01$). The proportions of males and females in each population studied were 47% and 53% for *C. anguillaris* Bouaké and 43% and 57% for *C.anguillaris* Niger. This gives a balanced sex ratio of approximately 1 :1. This mixed composition (1 : 1), as HENKEN *et al.* (1987), indicate, seems to favor better growth and nutrition for a species of the same genus : *Clarias gariepinus*.

The survival rates recorded at the end of the culture cycle were almost the identical for the two strains, varying between 76.6 and 90% for *C. anguillaris* Bouaké and between 76.6 and 96.6% for *C. anguillaris* Niger. Also, the two strains had fairly close growth performances. However, they were significantly different

(P<0.05and p<0.01). *C. anguillaris* Niger moved ahead of the Bouaké strain from the second month, lasting through the end of the culture period (Fig. 1).

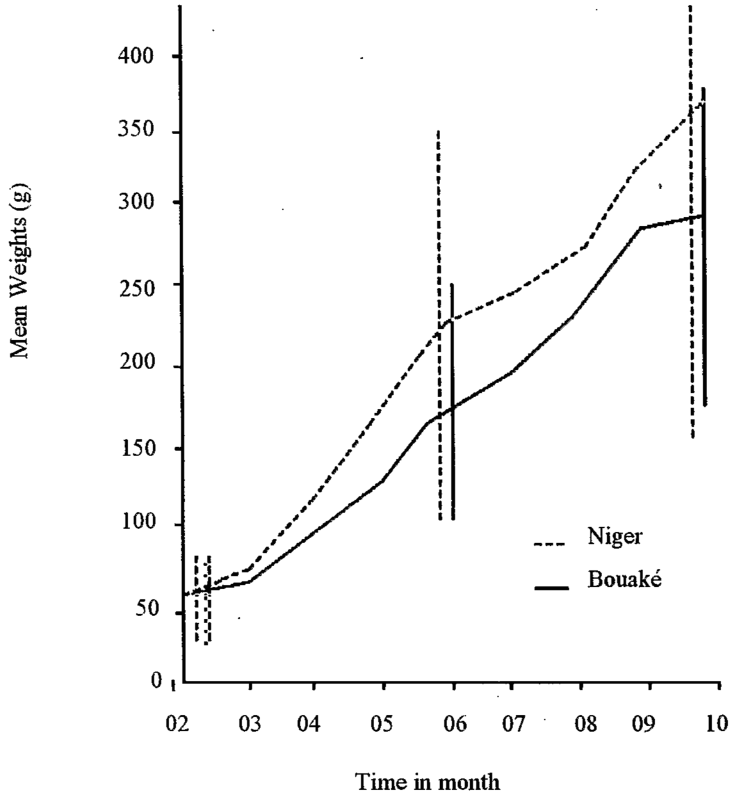

Figure 1
Evolution of the mean weights of individuals of the Bouaké and Niger strains of *C. anguillaris*. Vertical barscorrespond to confidence intervals.

The regression equations relative to the growth of the two strains are as follows :

- $PB=36.92 + 1.11x$, for *C. anguillaris* Bouaké
- $PN=42.26+1.36x$, for *C. anguillaris* Niger

where P = weight in grams and x = time in days. The difference in growth observed between the two strains was elatively small and could mainly be explained by the heterogenous mixture of sizes in the populations of each strain tested and not by the sex ratios. Despite the important ratio of males, the Bouaké strain had a lower growth rate. The overall mean daily growth rate was 1.0+0.5 g/d for the Bouaké strain and 1.23+0.5 g/d for the Niger strain. The respective mean weights in the second month of culture were 94.03+45.2 g for the first strain and 113.39+62.4 g for the second. In the eighth month, the values obtained were 301.58+87.31 g and 371.07+182.12 g respectively. Also, the Niger strain offered a better feed conversion for the feed M2GE, 4.4+0.2 *versus* 6.0+0.4 for the Bouaké strain. The observed difference was statistically significantly ($p<0.05$ and $p<0.01$).

Conclusion

The results of the experiment show that *C. anguillaris* Bouaké and *C. anguillaris* Niger are two close strains, at least concerning the zoo-technical parameters studied. They present similar growth and feed conversion rates. The Niger strain has a better growth rate, but the statistical analysis suggests that the differences in growth recorded may not appear if homogeneous populations (size and weight) were used. This suggests that the Niger and Bouaké strains could be used interchangeably for a culture cycle of eight months. In the interest of preserving the biodiversity of aquacultural species, the culture of these two strains should be carried out in the areas of their respective natural distributions.

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