Growth Performance Of Oreochromisniloticus In Association Withclarias Jaensis In Fertilized Ponds With Fowls And Pigs Droppings

Desire Etaba Angoni, Minette Tomedi Eyango, Joseph Tchoumboue

ABSTRACT: The experiment was conducted in Nkolnkondi II, Central Region-Cameroon with the main objective of contributing to ameliorate the massive production of Oreochromis niloticus associated with Clarias jaensis in fertilized ponds. A total of 500 fingerlings of Clarias jaensis and 1000 fingerlings of Oreochromis niloticus with their respective average weights of (20, 39±4,87g) and (15, 32±3,01g) were stocked in three treatments. The treatment (To) is a control not treated with fertilizers and the treatments (T1, T2) consist of a portion of fish fed with fowls and pigs droppings. The following results were obtained : final average weight, weight gain, daily weight gain and the specific growth rates of T0 in Oreochromis niloticus were : (147,45±0,07 g) ;(128,12±0,87g);(1,26±0,73g/j) those of T1 and T2were respectively (171,00±0,97g); (153,69±1,99g); (0,84±0,06g/j); (1,33±0,62%g/j) and (151,60±1,99g);(115,32±1,29g) ;(0,64±0,24g/j) ;(1,19±0,16%g/j). But those in Clarias jaensis were as follows ;T0 (138,20±0,92g) ,(124,42±2,51g);(0,38±1,08g/j), (1,13±0,51%g/j), T1 and T2 were (158,63±1,69g) ,(122,93±1,02g) ,(0,74±0,09g/j),(0,41±0,09g/j),(0,41±0,11%g/j) and (125,07±1,28g) ;(108,90±1,69 g) ;(0,21 ±0,03 g/j) ;(0,52 ± 0,35g/j) respectively. For survival rate, the followings [(82,15±1,06 %) ,(76,53±1,46%) ,(86,63±1,29%) and (96,20±0,12%) ,(92,36±1,02%) , (94,16±0,09%)] were respectively obtained in Oreochromis niloticus and Clarias jaensis in treatments T0, T1 and T2. It was observed that the treatment T1 from the portion fed with fowls droppings recorded a high significant value ($p<0.05$) in final average weight, weight gain, average daily gain and specific growth rate of juveniles of Oreochromis niloticus with respect to T0 and T2.

Key words: Clarias jaensis, growth, organic fertilizers, Oreochromis niloticus, ponds,

Introduction

The breeding model of associating Tilapia and African Catfish (Clarias gariepinus) constitutes one of the most promised models by Aquaculture vulgarisation services in Cameroon despite its dependence on the producers of fingerlings in hatcheries. This model exists today in certain regions of Cameroon, notably the Centre Region, where there is the necessity to intensify small surface areas of ponds. However, this model is disadvantageous in that there is a high growth of Clarias gariepinus beyond a certain weight, which leads to the abandonment of fingerlings and focusing on Tilapia of larger sizes, hence impacting negatively on the final yield [6] cited by [3]. Other models of association have been developed with strict fish eater, hence, the association of same sex tilapia with Hemichromis fasciatus or Parachana obscura [8]. These latters, though efficient in the control of the proliferation of Tilapia, does not contribute significantly to yield coupled with ignorance on sexing techniques by almost all producers.It was therefore necessary to search for another Clariidae species which could ensure the control of the proliferation of Tilapia without affecting its initial population as much as on food.

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Thus, Clarias jaensis closely related to Clarias gariepinus, with low growth rate and its availability in natural medium, could be the best substitute. Reason why the objective of this study is to contribute to ameliorating the production of Oreochromis niloticus on a breeding model of associating Tilapia and African Catfish in ponds and most significantly to evaluate some growth characteristics of Tilapia(Oreochromis niloticus) in association with C.jaensis in fertilized ponds.

1. Materials and Methods

1.1 The zone of Study

This study was conducted from the 20th March to 20th August 2013 in Nkolnkondi II area situated in Yaoundé V in the Center Region of Cameroon(.N : 3° 52', 11°31'E) with the average altitude of 750m. The climate is of Yaoundé equatorial type characterized by two dry seasons and two rainy seasons. As regard to temperatures, they vary between 16° and 31°C. We register an average temperature of 23,5°C and 1650mm of water per year[11].

1.2 Conduction of the experiment and collection of data

Nine (09**)** ponds with surface area of 50m^2 each were used in this experiment**.** The animal materials was made of 500 juveniles of Clarias jaensis and 1000 Oreochromis niloticus of average weights (20,39±4,37g) and (15,32±3,01g) collected from the natural environment and aquaculture breeding stations respectively. Three portions of Clarias jaensis and Oreochromis niloticus were distributed in three(03) treatments : the treatment T0 was composed of a portion of fish that have not been treated with fertilizer and the treatments T1, T2 were made up of portion of fish fed with fowls' and pigs' droppings. Each treatment was applied in triplets (triplicates) and in a random manner. The application rate of organic fertilizer was 20kg per acre, then 5kg per acre for 2times/week [18]. Control fishing took place every 21 days after stocking. Fishes were counted

before stocking at each stage of control fishing and at the end of the experiment.

1.4 Parameters studied

1.4.1 Growth and survival parameters

- Survival rate (%) SR = fnf/ inf(fnf=final number of fish, inf=initial number of fish)
- Average Daily Gain(ADG) g/d. ADG= faw-iaw/t(faw = final average weight; iaw = initial average weight)
- Average weight gain(WG/g), WG(g) =(faw-iaw)
- Specific growth rate (%g/d) , SGR = 100[Ln(faw)-Ln(iaw)] / Δt where, Δt = period of experiment in days
- The relation Weight-length [16] , $TW = aTL^b$ [6] with a = regression constant, b = allometry coefficient, TL = total length(cm), TW = total weight(g)
- Coefficient of K condition, $K = 100*W/L^3$, with W = weight (g) of fish and L = total length (cm) of fish.

1.5 Statistical Analysis

The data obtained and the parameters calculated were subjected to an analysis of variance ANOVA I followed by Duncan multiple test between the averages to the threshold of 5%.

2. Results and Discussion

2.1 Results

2.1.1 Growth performance and survival of Oreochromis niloticus associated withC.jaensis in fertilized ponds

It results from the table 1 that whatever the species considered the average final weights, Weight gain, the average daily gains, the specific growth rates and the survival rates were significantly different (P<0, 05) between the three treatments T0, T1, T2.

Table1*:Growth performance and survival of Oreochromis niloticus associated with C.jaensis*

P.	Sp.	Treatments		
		T0 (no fertilizer)	T_1 (fowl droppings)	T_2 (pig droppings)
faw(g)	C.j.	138,20±0,92[a]	158,63±1,15[b]	125,07±1,28[c]
	O.n.	147,45±0,07 [a]	171,00±0,97[b]	151,60±1,99[c]
WG(g)	C.j.	124,42±2,51[a]	122,93±1,02[a]	108,90±1,69[c]
	O.n.	128,12±0,87[a]	153,69±1,99[b]	115,32±1,29[b]
ADG(g)	C.j.	0,38±1,08[a]	0,74±0,099[a]	0,21±0,03[a]
	O.n.	0,71±1,025[a]	0,84±0,061[b]	0,64±0,24[a]
SGR (%/j)	C.j.	1,13±0,51[a]	0,41±0,11[b]	0,52±0,35[b]
	O.n.	1,26±0,73[a]	1,33±0,62[a]	1,19±0,16[a]
VC (%)	C.j.	15,06±3,41[a]	16,32±1,5[a]	14,6±2,66 [a]
	O.n.	13,03±2,97 [a]	12,6±3,22[a]	10,08±2,65[a]
SR (%)	C.j.	96,20±0,12 [a]	92,36±1,02[a]	94,16±0,09 [a]
	O.n.	82,15±1,06 [a]	76,53±1,46 [b]	86,63±1,29 [a]

faw(g)=final average weight ;WG(g)= weight gain; DAG(g)=daily average gain ; Sp=species; P=parameters

SGR(%g/d)= specific growth rate ; VC(%)=variation coefficient ; ;SR(%)=survival rate ;C.j=Clarias jaensis ; O.n.=Oreochromis niloticus a ,b, c : for each line, the values affected by the same letter are not significantly different(P<0,05)

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2.1.2 Relation total weight-total length in different treatments

Table 2 shows that some is the species considered growth is of the isometric type (b> 3) at O.niloticus and it is of allometric type (b< 3) at C.jaensis .Condition factor at O.niloticus K >1 in the treatments T_o,T_1 ,T_2 but at C.jaensis K<1 in treatments T_o,T_2 and K>1 in treatment T_1 .

Tableau 2: Average of the parameters of the Relation total weight-total length in different treatments and condition factor

Tr.	Sp.	N	R^2	A	b	Gt	K
T0	O.n	18	0,978	0,006	3,163	Pi	2,38±0,03
	C.j	18	0,924	0,046	2,809	Pa	0,9±0,01
T1	O.n	17	0,013	0,962	3,233	pi	2,98±0,05
	C.j	15	0,975	0,067	2,609	Na	1,8±0,02
T2	O.n	15	0,916	0,016	3,267	i	1,7±0,01
	C.j	19	0,929	0,046	2,903	Pi	0,8±0,09

N=Number of fish; R^2=determination coefficient; C.j=Clarias jaensis; O.n. =Oreochromis
a, b=Estimated parameters of the relation Weight-Length; K= condition factor ; Tr=treatments;Sp=species
Pi=positive isometric; Pa=positive allometric; Pi=negative allometric; I=isometric; Gt=growth type

2.2 DISCUSSION

The growth performance and survival of O.niloticus in polyculture in fertilizers ponds illustrated in table 1 show that whatever the species considered, there exist a significant difference between the final weights, weight gain and the specific growth rates. This can be imputable by more efficient use of endogenous and exogenous (natural productivity) food resources of breeding ponds observed by [5] cited by [14]. Besides, ,[20] cited by [9] found an average final weight of 184g, weight gain of 36g and a specific growth rate of 0.5%g/d respectively in polyculture in fertilized ponds using fowls' droppings, confirming to those of the present experiment. The survival rate and the average daily gain in O. niloticus recorded in this experiment were significantly higher in C.jaensis compared to those in O. niloticus confirming to the observation of [13] cited by [3] than O.niloticus fed by filtration of breeding effluents from C.gariepinus which in turn control reproduction. The results of this experiment are similar with those obtained by [20] cited by [19] where the values were 0.4g/d; 65% in O.niloticus and 1,04g/j; 95% in C.gariepinus. This can be explained by the predatory action exerted by C.jaensis on O.niloticus permitting O.niloticus to grow faster with respect to C.jaensis. The values of variation coefficients of two species in the three treatments show that heterogeneity of size varies in O.niloticus from 10, 08 to 13, and 03 and from 14, 6 to 16, and 32 in C.jaensis. Though, it does not present significant difference. The factors of K condition of two species increases with age. During the experiment, Clarias jaensis in treatment T1 recorded a condition factor greater than 1 and O.niloticus in the three

treatments To, T1, T2. These values according by [4] cited by [2] show that these two species were in the state of stoutness during the experimental period. These coefficients have not been in the fork of values reported by [16] and [17] from 0, 79 to 0, 83% respectively in Clarias gariepinus cultured at different stocking densities and fed with artificial feeds. Evolution of the relation Total weight- Total length shows that in O.niloticus, the values of the parameter b are about 3 for T0, T1, T2 indicating individuals of these portions other than the form of the body which does not change during the growth, the results are similar to those of [3] in 2008 in Gymnarchus niloticus expressing a positive isometric growth. In C.jaensis, the values of b are respectively 2,809; 2, 609; 2,903 for T0, T1, T2 showing that the development of the body is slower than those of the size and the growth is a negative allometry (Table 2). These results in C.ebriensis corroborate with those of [19] in 2010 in the delta of Oueme in Benin. Definitely, the values of b in C.jaensis are closer to 3. We can therefore say that C. jaensis could have had an isometric growth.

Conclusion

The growth characteristics of O.niloticus in association with C. jaensis in ponds have permitted to release the following results: final average weights, weight gain, average daily weight and the specific growth rates of the treatment T1 in O.niloticus were significantly different (P<0,05) compared to T0 and T2 in C. jaensis. The values of the survival rates recorded in O.niloticus were lower than those of C. jaensis. The association of O.niloticus-C.jaensis was efficiently established due the predatory action that C.jaensis exerts on O.niloticus and considered as a strict predator. In rural fish farming, C.jaensis will be a potential predator that must be used in polyculture.

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