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Effect of the Amount of lipids on the growth of Oreochromis Niloticus (L) in Kisangani, (Rdcongo)

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Abstract: *A study has been undertaken in Kisangani area using experimentally two different types of feed RO and R12 in order to verify the lipids effect on Tilapia niloticus growth rate. It resulted from the study that Tilapia niloticus has doubled weight during all the experience. According to the t test of STUDENT calculated between the gain of body mass of fish fed with the food R0 supplemented with 12% of palm oil and those fed with the R12 non supplemented diet with palm oil showed a non-significant difference (P<0,05). The SGR (Specific Growth Rate ''SGR'') appeared meaningfully and significantly correlated to the fed. The addition of the palm oils to the food improves the specific growth rate varying between 2, 62 %. day for the food supplemented with 12% of lipids (palm oil)), and 1, 34%. day for the food without lipids. The results of mortality rate during this experience did not seem being correlated to the different diet but rather to the manipulation of fish and other experimental protocols artefacts. The protein content of the carcasses of Tilapia varied between 0,043% for the food R0 and 0,056% for the food R12. The diet R12 appeared performing compared to the diet R0 according to body protein gain by unit of consumed protein and for the weight gain by unit of consumed protein by Tilapia niloticus.*

Keywords: *growth; Tilapia; Oréochromis niloticus; lipid and Kisangani-DR Congo*

I. Introduction

In the past, fishing in sea and in African continental waters was productive, the catches of fish in the natural environment could cover the demand for the population. For twenty years, there has been a gradual decline in fisheries production globally, this scourge also affects the African continent where the decrease in fisheries resources can be aggravated by several other reasons under geographical areas.

In the Democratic Republic of Congo, it is especially the inefficiency of the regulation and the control of the fishing which amplifies the reduction of the productivity of our rivers and the lakes, as well as the rivers. On the other hand, in some fishing areas, such as Lake Edward, the production tools are lacking in maintenance because of low income and often insufficient training for fishermen. All of this makes fishing unproductive. However, fish production in R.D. Congo was estimated in 2006 at 250,000 tonnes of fish against a demand of around 80,000 tonnes (Kestemont, 1998).

Economic operators have tried to make up for this deficit by massive imports of fish to big cities, but unfortunately the shortage has remained glaring in rural areas because of political instability or less profitability for imports. Bearing this in mind, we believe that fish farming would be one of the effective solutions to improve meat production in the specific context of our country; because it can be integrated into local farming systems.

Therefore, the need to develop this sector is acquitted to reverse this trend and fight against malnutrition that is settled in the country. Several factors are held responsible for the poor performance of Congolese aquaculture (Nyongombe, U., 1993). The most cited are the absence or insufficiency of quality juvenilles, the lack of fish foods, the poor fishing line, the inadequacy of extension methods and difficult access to investment capital as well as the lack of introduction of new aquaculture species, coronary on the one hand, policies and unfair approaches, and others on the lack of a strategy and national plan for subtainable development of the aquaculture sector (N'shimba, S-W-M; 2008). As a result, aquaculture is still essentially a craft activity, possibility of providing professional opportunities. Production is relatively low and intended for family consumption or small-scale marketing. (Mate, M. 2001). Taking into account these evidences, we believe that fish farming would be one of the effective solutions to improve carné production in the specific context of the Democratic Republic of Congo, as it can be integrated into local agricultural systems.

It is with this in mind that this study was initiated to determine the effect of the amounts of lipids added to the diet on the growth of Oréochromis niloticus in Kisangani. The main objective of this study is to evaluate the implications of lipid intake on the growth of Oréochromis niloticus. For the present study we wanted to test the hypothesis that: the use of lipids as a nonprotein energy source would allow the use of proteins for growth, rather than as a source of energy storage. This work aims to understand the mechanism related to the use of dietary lipids in the growth of fish (Tilapia), but also to open new perspectives in the field of animal nutrition.

II. Review of Literature

2.1. Middle

The study was conducted in the province of Tshopo, within the Institute of Agronomic Sciences of Yangambi, Yangambi, Democratic Republic of the Congo. This city is included in the climate area climate area, 0°31N, 25°11S and between 376 and 460 m altitude, with a climate of the AF type (Nyongombe. U, 1993).

Sea pandanus, also known as pandanus mat (Pandanus tectorius Park), is native to islands in the Pacific, Northern Australia, Southeast Asia, and South Asia (Heyne, 1987; Thomson et al., 2006; Adkar & Bhaskar, 2014). It grows near the coast to the mainland with a height of up to 600 m above sea level, even more (Thomson et al., 2006). Sea pandanus grows near beaches, rivers, ponds, channels or other bodies of water (Figure 1).

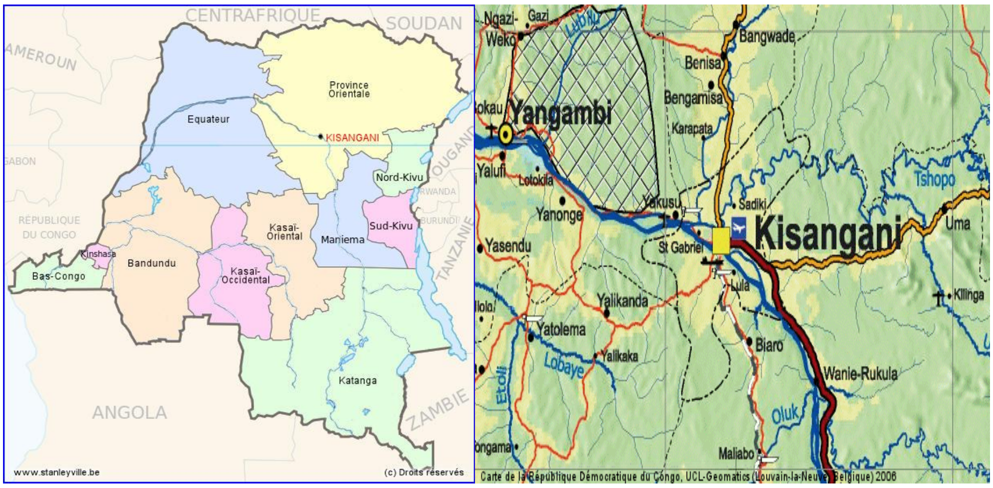


Figure 1. *Map of Kisangani City (Source: www. google)*

2.2 Laboratory Equipment

The materials used in the laboratory for the completion of this study are: Bakelette Aquamerk; Water thermometer; Precision balance; Pissets; Test tubes; Gauge Ballon; Erlenmeyers.

2.3. Produits chimique de laboratoire

The chimicals we used to use for protein materials are: Boric acid (H_3BO_3) , sulfurc acid (H_2 SO4), tashiro mixed indicator , distilled water.

2.4 Biological Material

The tilapia juveniles used in this study, were provided by the Agility octiccone IKENGE. 180 fish were selected and distributed at 45 fish by happas. The initial average biomass was 147,5 g ± 8,4 g by batch and the individual average weight was 3,27 ± 0,18 g.

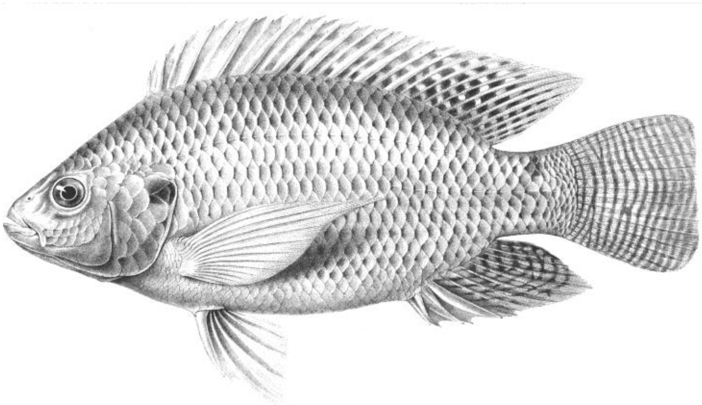


Figure 2. *Oreochromis niloticus (L)*
Source: Kestmont, 1998

III. Research Methods

The study was to determine the effet of the amounts of lipids provided to the supply of Tilapia (*Oréochromis niloticus*). To this end, we analyzed the protein content of the tuilapia juvenile muscles. The experiment itself began on 25 july, the day after the payment and ended on august 25 ,2011. Fish was submitted to a period of acclimatization of fifteen days before the work, during which they were fed with a repository system to gradually adapt to experimental regimes.

The juveniles were stocked in the open circuit happas placed in a fish pond of the IKENGE agro-fish area. The pond was made of 4 polyesters happèrent of useful dimension of 150 cm x 180 cm x 160 cm each, containing 45 juveniles to each. A daily temperature control has determined the average temperature during experience, which was 21,2 ± 2,3 °C. The dead fish were taken and weighed daily. Happas have been regulary siponed, complete cleaning being all fifteen days. The fish were fed ad libitum in a passage, twice a day (8 : 00 and 16 : 00) . The ration distributed daily at summer weighted in gram (g).

Figure 3. *Experimental Device (Happas)*

3.1 Experimental Foods

The two plans have been developed within the animal nutrition laboratory of IFA-Yangambi in Kisangani. They contained 30 % of proteins with a test system with 12 % lipids. With R0 : food containing 0% lipids and R12 : food containing 12 % lipids. Thes plans have been used in duplicate, for reason for the statistical processing of results.

Table 1. Composition of Two Experimental Schemes (Quantily in Gram for 100 g of Food)

Régimes	R0	R1
Fish Flour	29,7	26,6
Palm oil	-	12
Rice sound	52,3	45,0
Soy flour	14,8	13,3
Mineral mix	**3**	**3**

Food powder were mixer by hand in a plastic bucket, which is then adding the palm oil and the boiled in the water, to give a consistency to the dough. The latter is in the friction hunted in order to give him an aspect of fine pudbies tha have been dried in ambient air during 72 hours. The Budins were then broken to obtain the desired final shape: a granule from 0,5 to 1 cm long. The plans made were stored in a bag permanently. At the beginning of the experience, one fish was taken by treatment and kept in the freezer. At the end of the experience, two fish per treatment were sacrificed also. These fish we used to perform bodily protein assays at the end at the beginning of experience. These assays were performed by the KJELDAHL method.

Figure 4. *The differences of Diets Play*

3.2 Evaluation of the Growth and Use of Food

From the results obtained, several parameters were calculated to evaluate growth and feed efficiency (MONENTCHAM, 2009). These parameters are:

- ➢ The specific growth rate (TCS);
- ➢ Weight gain (GP) in%;
- ➢ Food Efficiency (CEA);
- ➢ The protein efficiency ratio (CEP) and
- ➢ Protein retention (PR).
- ➢ Determination of the protein content of whole fish (Kjeldahl method);

Protein content = total nitrogen x **6.25**

The formulas for calculating these factors are:

TCS (% d-1) = 100 (Ln Pf-Ln Pi) / ∆T
GP (%) = 10 [(Pf-Pi) / Pi]
CEA = (Weight gain of poisons including biomass of the dead) / Q
CEP = (Weight gain of poisons including biomass of the dead) / P

RP = 100 [((Pf * PCf) - (Pi * PCi)) / (Q * PA)]

Where Pf = final weight in g; Pi = initial weight in g; T = duration of the experiment in day; Q = quantity of food distributed in g; PCf = final protein body content; PCi = initial protein body content; PA = protein content of the food.

3.3 Mass Gain (G), calculates the following formula :

$$G (\%) = \frac{100 \times (Pf - Pi)}{Pi}$$

Pf = final mode weight (g)
Pi = initial average weight (g)

3.4 Specific Growth Rate (TCS)

The individual weights taken and in a beginning, of experience, allowed us to estimate the Specific Growth Rate (TCS) in percentage.

$$SGR (\%.j^{-1}) = \frac{(Ln\ Pf - Ln\ Pi) \times 100}{\Delta t}$$

Pf = final mode weight (g)
Pi = initial average weight (g)

3.5 Mortality rate (M)

Calculates according to the following formula :

$$M (\%) = \frac{100 \times (Ni - Nf)}{Ni}$$

Ni = initial number of fish,
Nf = final number of fish.

3.6 Protein Efficiency Ratio (PER)

It indicates the weight gain per protein unit consumed, which indicates whether the protein source of the food meets the requirements of the species. This parameter is calculated as follows :

$$PER = \frac{(Pf - Pi)}{RdPC}$$

Pf = final mode weight (g)
Pi = initial average weight (g)
RdPC = Protein ration consumed (g)

3.7 Protein Production Value (PPV) ou Protein Efficiency

It indicates the gain of body protein per protein unit consumed (en %) according to the formula:

$$\text{PPV (\%)} = \frac{100 \times (Prf - Pri)}{RdPC}$$

Pri = Protein contained initially by fish (g);
Prf = Frespine continues finishing F(g)
RdPC = Protein ration consumed (g)

3.8 Statistical Data Processing

Raw date was entered into Excel software. Statistical analysis was performed manually by student's t test. A significant probability threshold of 5 % was uded.

IV. Discussion

Table 2 takes over the main zootechnical settings taken into account during the experience. The values indicated the average of two observations made for each experimental regime. Some values are complemented by a de-gap-specification specifying the existing variation within the same regime.

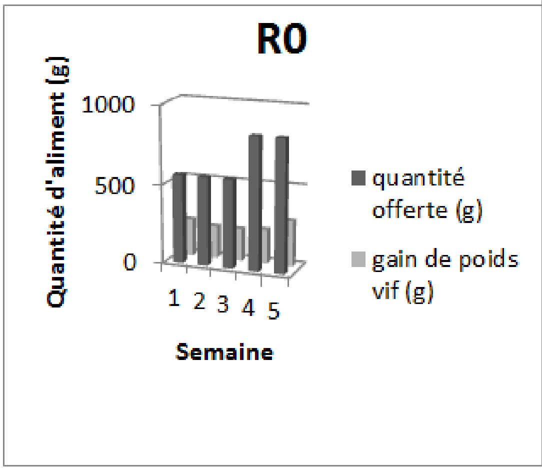
Table 2. Influence of Food Diets Tested on the Main Zootechnical Parameters of Juvenile Breeding of Oréochromis Niloticus

parameters	Régime 0	Regime 12
Initial number	90	90
Final number	40	72
Mortality (%)	56	19
Initial Biomasom (g)	153,5	141,5
Final Biomasom (g)	228,1 ± 3,27	303,72 ± 5,74
Finale Biomasom + dead (g)	231,64 ± 3,27	308,26 ± 5,74
Average original weight (g)	3,4	3,14
Average final weight (g)	5,7 ± 3,27	4,21 ± 5,74
G (% jour^{-1})	48	114,64
SGR (%.jour^{-1})	1,34	2,62

Legends: G = weight gain, SGR = specific growth rate, M = mortality rate, EA = feed efficiency

4.1 Growth and Mortality

Biomasses as well as the average weights of fish were homogeneous from the experience. It turned out that fish have doubled in weight during the experience in the order 4,21 ± 5,74 for the food R12 and 5,7 ± 3,27for food R0. A non –significant diffence (p<0,05) could be highligted, according to the test t students, between the body mass of gross fish fed with the R0 regime and those fed with R12 regime. It is the latter showing the best performances, fish from an average initial weight of 3,14 g à 4,21 ± 5,74 g. In thirty days, a weight of 114, 64 %. Similarly, to what has been observed with the body weight gain, the specific growth rate is significantly correlated to the plan. The addition of palm oils to the feed improves the specific growth rate, ranging from 2,62 % per day for the 12 % lipid food, at 1,3 % per day for the limetic food.



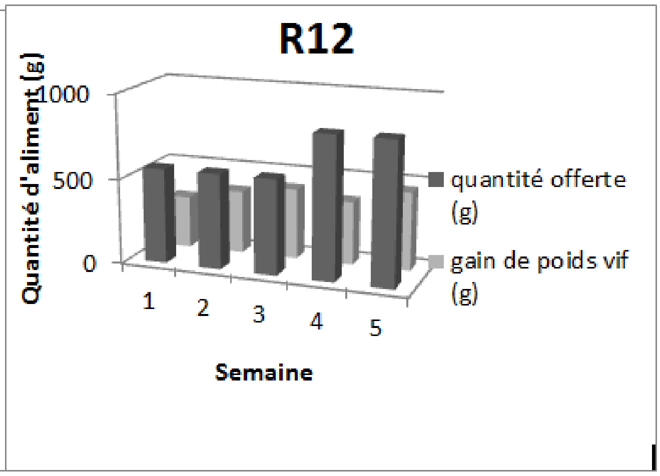


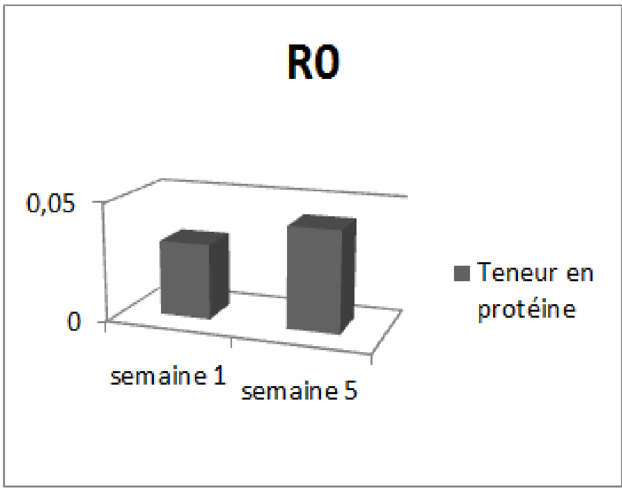
Figure 5a ***Figure 5b***

Figure 5a et Figure 5b: Influence of Different Diets on Body Mass Gain of Juvenile Tilapia Nilotica

This figure clearly indicates that the weekly consumption is not constant and without increase over time. However, in general, the differences between the plans have shown great evolution between the beginning and the beginning and the and of the experience; The same is true for the 12 % diplôme system that has emerged from the other from the first week with regard to the body weight of gods; the gap was dug between the ci and the diet of 0 % lipids. The variability marked between the diets, as shown in figs 5a and 5b. The observed peaks correspond to the fifth week of experimentation and are due to the average weights of the fish. The mortality results obtained during this experience do not seem to be attributed to the various diets buts rather the dead armed were cheese. The deaths were observed from the first week of feeding.

4.2 Reset Assistance of the Total Proteins

Date on total body protein levels of fish were evaluated in early and at the end of the experiment (Figure 6). From thes results and the protein ration consumed, the PER and the PPV were calculated (Table 3).



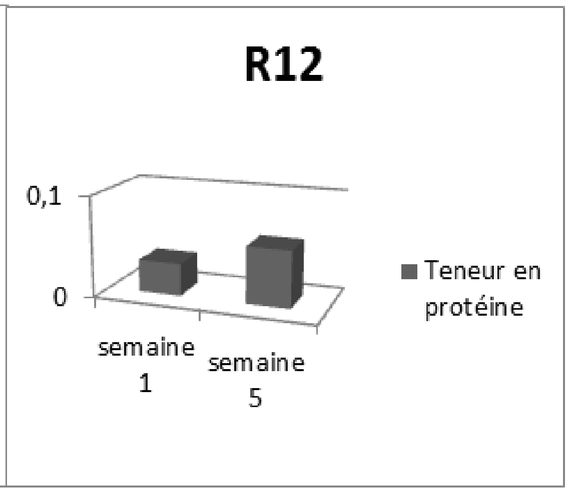


Figure 6a ***Figure 6b***

Figure 6a et 6b: *Protein content of the Tilapia juveniles at the beginning of experience and at the end of the experience based on the tested foods*

The protein content of the tilapia carcasses at the end of the experiment varies between 0,056 % of raw protein in 0,2g of weight of the fish muscles for R12 regime and 0.043 % raw protein for R-regime. The initial protein content is less at the end of the experiment. The raw protein content of fresh materials from the fish muscles was 0.032% PB.

Table 3. Protein Efficiency Rate and Protein Production Values According to Different Diets

	R0	**R12**
PER	**0,00192**	**0,00410**
PPV (%)	**0,00077**	**0,00168**

In the light of this table, we find tha there are differences betwueen the per and PPV values following the diets. Thes differences are as follows:

- For the per différence varies from 0,00410 for the R12 and 0,00192 regime for the R0 regime.
- For PPV, the difference varies from 0,00168 for R12 and 0.00077 for d system.

As a result, the R12 system has been highforms compared to R0 for the gain of body protein per unit of protein consumed and for weight gain per protein unit consumed.

V. Conclusion

This study had a thirty day of july 25 to August 25, 2011. It aims to assess the implications of lipid inputs on the growth of Tilapia Nilotica. In fact, we had assumed the use of lipids as a non-protein energy source would allow protein use for growth rather than as a source of energy, 180 fish were selected and distributed at 45 fish with happas and fed with two types of R12 foods with 30 % protein nonsense in lipids. After analysis of the results, we noticed tha fish growth had doubled during experience in the order of 4,21g ± 5,74g of R12 and 5,7g ± 3,27g of R0.

According to the t test of STUDENT calculated between the gain of body mass of fish fed with the food R0 supplemented with 12% of palm oil and those fed with the R12 non supplemented diet with palm oil showed a non-significant difference (P<0,05). The SGR (Specific Growth Rate ‘‘SGR’’) appeared meaningfully and significantly correlated to the fed. The addition of the palm oils to the food improves the specific growth rate varying between 2, 62 %. day for the food supplemented with 12% of lipids (palm oil)), and 1, 34%. day for the food without lipids. The results of mortality rate during this experience did not seem being correlated to the different diet but rather to the manipulation of fish and other experimental protocols artefacts. The protein content of the carcasses of Tilapia varied between 0,043% for the food R0 and 0,056% for the food R12. The diet R12 appeared performing compared to the diet R0 according to body protein gain by unit of consumed protein and for the weight gain by unit of consumed protein by Tilapia niloticus. Weekly consumption was constant from the first week in the third week. She had increased to the fourth and fifth week over time. This, in general, the differences between the plans have shown large developments between the beginning and the end of the experimentation.

The same is true for the 12% diplom-scheme that has emerged from the other R0 from the first week. With regard to the body weight, gap dizzy between the 12% lipid food and the scale at 0% lipids. The variability marked between the diets, as shown in figure 1. The observed peaks correspond to the fifth week of experimentation and are due to the average weights of the fish. The mortality results obtained during this experience do not seem to be attributed to the various diets buts rather the dead armed were cheese. The deaths were observed from the first week of feeding. The protein content of the tilapia carcasses at the end of the experiment varies between 0,056 % of raw protein in 0,2g of weight of the fish muscles for R12 regime and 0.043 % raw protein for R-regime. The initial protein content is less at the end of the experiment. The raw protein content of fresh materials from the fish muscles was 0.032% PB.

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