SRYAHWA PUBLICATIONS

Journal of Aquatic Science and Marine Biology
ISSN: 2638-5481 | Volume 5, Issue 1, 2024
https://doi.org/10.22259/2638-5481.0501002

RESEARCH ARTICLE

Effect of the Substitution Levels of *Zea mays* by Ripe and Unripe Banana Peels Powder *Musa paradisiaca* on the Survival and Some Growth Characteristics of *Clarias jaensis* (Boulenger, 1909) Juveniles

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Received: 29 March 2024 Accepted: 27 April 2024 Published: 02 May 2024
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Abstract

In order to contribute to the improvement of *Clarias jaensis* feeding in an intensive system, the effect of *Zea mays* substitution level by *Musa paradisiaca* ripe and unripe peel flour on the survival and some growth characteristics of *Clarias jaensis* juveniles was studied at the "Common Initiatives Group of Agricultures and farmers of Biological products of Cameroon" (3°55- 4°67LN and 9°46- 11°52LE), Centre-Cameroon Region. To this end, 315 *Clarias jaensis* juveniles (65.5 ±10.61g) were randomly distributed in 21 plastic tanks containing 60 liters of water each at a density of 250 individuals/m3 and divided into seven comparable batches with three repetitions, corresponding to 0; 5; 10; 15% substitution of corn meal by that of ripe and unripe peels of banana *Musa paradisiaca*. Fishes were fed 02 times a day (8 a.m. and 6 p.m.) at 5% ichtyo biomass for 84 days. The results obtained were as follows: survival rate was comparable between treatments (100, 00 ± 0.00%), mean final weight was higher in individuals fed on 15% ripe peels of banana Musa paradisiaca (77.87 ± 4.69g), mean daily gain and specific growth rate were higher with the 15% ripe Musa paradisiaca peel diet (0.18± 0.13 g/d and 0.27 ± 0.03 % g/d), the consumption index and feed cost to produce one kg of *Clarias jaensis* were lower at 15% (1.25±0.03 and 637.5 Fcfa) and higher at 0% (1.6 ± 0.04 and 832 Fcfa).

Keywords: Feeding, *Clarias jaensis,* growth, *Musa paradisiaca*. Substitution.

1. Introduction

Fishing and aquaculture remain for a hundred million people around the world, a resource of primary importance, food, income or livelihood. Worldwide, the fish supply has reached a record 20.3 kg/inhabitant/year [1] and it remains one of the most consumed foods in Africa. It thus contributes around 50% of animal protein intake in Sub-Saharan Africa, and covers almost 50% of people's demand for animal protein in Cameroon [1]. National demand for fish products has raised considerably in recent years as a result of growing population trends. It rose from 409519 tonnes in 2013 to an average of 433616 tonnes in 2015, and forecasts for 2020 are estimated at 496891 tonnes [2]. However, fishing alone is no longer sufficient to sustainably satisfy the ever-increasing demand, due to overfishing, climate change and environmental degradation [3]. Faced with this drastic situation, aquaculture is becoming an indispensable alternative for fish production. However, its emergence is confronted with several ills, of which food remains

Citation: Zango P, Mutlen M, Ngouana T. R, *et al*. Effect of the Substitution Levels of *Zea mays* by Ripe and Unripe Banana Peels Powder *Musa paradisiaca* on the Survival and Some Growth Characteristics of *Clarias jaensis* (Boulenger, 1909) Juveniles. Journal of Aquatic Science and Marine Biology. 2024; 5(1):11-20.

one of the main ones [4] due to the unavailability of food, the high cost of inputs and their quality on the health of the end consumer [1]. The use of synthetic products such as amino acids is one way of solving this problem.

Feeding represents a significant proportion of fish production costs [5]. In intensive aquaculture, feed accounts for 55 to 60% of fish production costs. Reducing feed-related expenses, and consequently lowering the total cost of fish production, is one of the priorities in Aquaculture [6]. The use of imported feeds in fish farming is a common practice in most developing countries. The economic interest of this type of farming is therefore highly dependent on the availability and cost of feed [7]. Aquaculture research must therefore turn to alternative sources. Hence the importance of this study based on the effect of the level of substitution of maize flour by flour from ripe and unripe *Musa paradisiaca* peels on the survival and growth performance of juvenile *Clarias jaensis* in tanks in the Yaounde locality.

In order to contribute to the improvement of the diet of *Clarias jaensis* in captivity through the use of feeds made from local by-products. This work aims to evaluate the effect of the level of substitution of corn flour by ripe and unripe plantain peel flour in the feed on the survival, some growth and economic characteristics of *Clarias jaensis* juveniles in plastic tanks.

2. Materials and Methods

2.1 Study Site

The study took place at the Common Initiatives Group of Agricultures and farmers of Biological products of Cameroon between March and July 2023 (LN 3°55-4°67 ; LE 9°46- 11°52), Central Cameroon Region.

2.2 Obtaining Plantain Peel Powder

After plantain (Figure 1a) had been used for human consumption, the ripe (Figure 1b) and unripe (Figure 1c) peels were collected from households and the upper and lower parts were removed to avoid fibre bulk, before being sun-dried (Figure 1d). They were then crushed separately and sieved to obtain plantain peel powder (Figure 1e).

The approximate composition of plantain peel powder and corn was determined according to the [9] method (Table 1), together with anti-nutritional factors (Table2).

Figure 1. *Process Production of plantain peel powder. (a) plantain peel;(b) ripe peel; (c) unripe peel;(d) dried peel;(e) plantain peel Powder*

Table 1. *Approximate composition of banana peel powder and maize*

Nutriments (%)	Banana peels powder		Maize
	Unripe	Ripe	
Humidity	8.57	7.04	-
Crude Proteins	6.85 - 13.73	7.18 - 10.21	8.06 – 10. 13
Lipids	9.46 -10.15	6.22 – 7.00	3.00 – 5.07
Glucides	51,86	42,95	72-73
Ash	10.12 - 11.72	2.00 -15.25	1.70 – 2.40
Fibers	6.00 - 8.00	9.88 – 14.31	2.48 – 3.35
Minerals	6	/	3-4
Energy (Kcal/100g)	47	52	99
Starch	8.6	9.3	34-35

Table 2. *Anti-nutritional factors detected in plantain peelings*

Banana peels powder	Antinutritional Factors (mg/g)			
	Tannins	Saponines	Phytates	Oxalates
unripe	5.37 – 5.41	7.71 – 7.78	9.83 – 9.91	0.78 – 0.87
ripe	4.22 – 4.75	5.13 – 6.09	8.93 – 9.06	0.39 – 0.49
Very ripe	2.13 – 2.87	3.14 – 3.29	10.98 – 11.22	0.29 – 0.39

2.3 Formulation of Experimental Diets

The ingredients used to formulate the diets were purchased from a feed mill on the local market, crushed and mixed by hand. Their composition is summarized in Table 3.

Table 3. *Composition of experimental diets*

Ingrédients	Substitution levels (%) of corn by banana peels Powder						
		5		10		15	
	0	RBPP	URBPP	RBPP	URBPP	RBPP	URBPP
Maize	20	19	19	18	18	17	17
Banana Peels Powder	-	1	1	2	2	3	3
Fish meal	25	25	25	25	25	25	25
Soya bean cake	23	23	23	23	23	23	23
Groundnut cake	15	15	15	15	15	15	15
Wealth bran	7	7	7	7	7	7	7
Cassava meal	6	6	6	6	6	6	6
Meal bones	1	1	1	1	1	1	1
Palm oil	2	2	2	2	2	2	2
Sodium iodine	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Premix	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Cost of one kg of Feed (Fcfa)	520	517,5	517,5	515	515	510	510
Biochemical Composition (% dry mater)							
Proteins	35,1	35.7	35.1	35,7	35.2	36.1	35.3
Lipids	7,7	4,7	7,4	5,2	3,6	10,9	6,3
Ash	19	11	13	11	14	11	14
Fiber	4,07	3,28	2,73	2,9	2,03	3,1	2,75
Dry mater	92,5	91,3	91	91,2	92,7	92,8	91,8

RBPP: ripe banana peels powder; URBPP: unripe banana peels powder

2.4 Conduct of the Study

For the study, 315 *Clarias jaensis* juveniles with a mean initial weight of 65.5 ±10.61g were obtained from fishermen in the Mungo Department. They were acclimatized in a 0.5m3 cubitainer for one week, where they were fed a local feed with 35% crude protein. They were then randomly distributed in 21 plastic tanks containing 60 liters of water each at a density of 250 individuals/m3 and divided into seven comparable batches with three replicates, corresponding to 0; 5; 10; 15% substitution of corn meal by that of ripe and unripe plantain peels.

In each rearing tank, a device for collecting uneaten food scraps (refusals) was installed, consisting of an 8cm-high, 10cm-radius plastic basin immobilized at the bottom of the water by a pebble (Figure 2), and a 5cm-radius circular pipe immobilized at the surface of the water by a rope to delimit the feeding area.

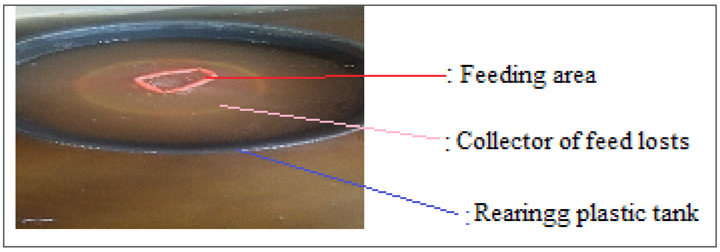

Figure 2. *Collection device for uneaten food (feed lost)*

Fish were manually fed 02 times a day (6 am and 6 pm) at 5% lichtyo biomass. Uneaten food scraps were collected before each meal, dried and weighed. The physicochemical parameters of the water (temperature, pH, ammonia, nitrite and nitrate levels) were measured once a week at three times of the day (6 am, 1 pm and 6 pm), and control samples were taken every 21 days to determine weight using a 1g scale. Total and standard lengths were measured using a ichtyometer, and at the end of the trial, the total number of individuals per treatment was determined.

2.5 Parameters Studied

- Survival rate (SR)

SR (%) = (Nf / Ni) x 100 Ni: Initial number and Nf: Final number

- Average Daily Weight Gain (ADG)

ADWG (g) = (FAWG - IAWG) / t; t= number of days

FAWG: final average weight; IAWG: initial average weight

- Specific Growth Rate (SGR):

SGR (% g /D) = [ln (FAWG) - ln (IAWG)] x 100/ t

- Consumption index (CI)

CI = (Amount of feed distributed – Feed lost) / AWG, Where AWG is Average Weight Gain.

-Condition factor K

K = W*100/ TL3 where W = weight (g), TL = total length (cm)

- Estimated cost price per kilogram of feed

Estimated cost price of a kilogram of feed= ∑ proportions of each ingredient X price of a kilogram of the ingredient.

Estimated food cost of production for one kilogram of fish

Estimated food cost of producing one kilogram of fish = price of one kilogram of food x consumption index (CI).

2.6 Statistical Analysis

The results obtained were subjected to a one-factor analysis of variance and Student's t-test. Duncan's test was used to separate means at the 5% level when there was a significant difference between treatment effect means. SPSS version 20.0 statistical software and EXCEL 2013 workbook were used for data processing.

3. Results

Daily evolution of the average weight of *Clarias jaensis* juveniles as a function of the level of substitution of maize meal by ripe and unripe banana peel powder *Musa paradisiaca* in the feed.

Figure 3 illustrates the daily evolution of the average weight of *Clarias jaensis* juveniles as a function of the level of substitution of corn flour by ripe and unripe banana peel powder in the food.

Average weight increased over time in all treatments. However, at the end of the trial, the highest value was obtained in juveniles fed the diet containing 15% substitution of corn flour by ripe banana peels powder, followed by the diet with 10% substitution of maize

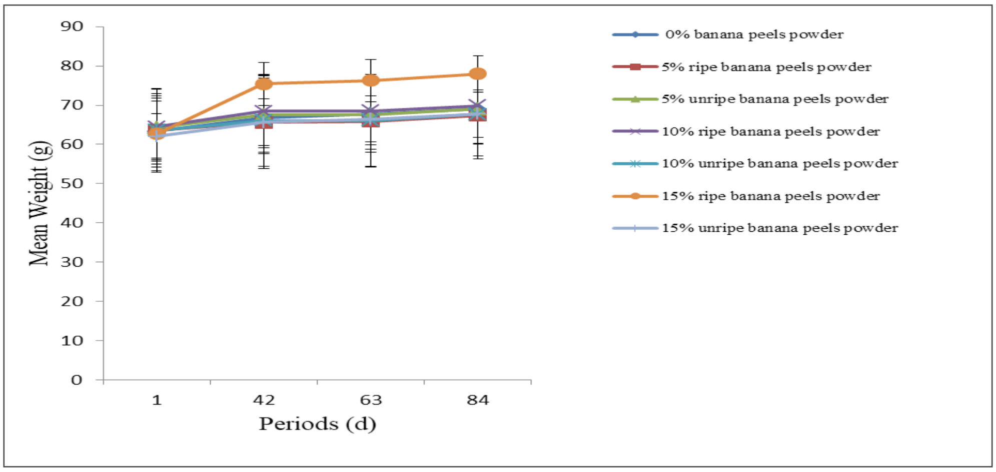

Figure 3. *Daily variation in the average weight of Clarias jaensis juveniles as a function of substitution levels of corn flour by ripe and unripe banana peels powder Musa paradisiaca.*

flour by powder from ripe banana peels, and significantly ($p<0.05$) lower in the diet with 5% substitution of maize flour by ripe banana peels powder.

Daily evolution of the condition factor K of *Clarias jaensis* juveniles as a function of the level of substitution of corn flour by flour from ripe and unripe *Musa paradisiaca* plantain peels in the feed

Figure 4 illustrates the daily evolution of the condition factor K of *C. jaensis* juveniles as a function of the substitution levels of corn flour by ripe and unripe banana peels powder in the food.

From this figure, the condition factor K was decreasing over the whole period whatever the treatment. Furthermore, the condition factor K was higher in juveniles fed the diet containing 15% substitution of corn flour by unripe *Musa paradisiaca* peel flour, followed by the diet with 10% substitution of corn flour by unripe *Musa paradisiaca* peel flour, and lower in juveniles fed the diet containing 5% substitution of corn flour by ripe *Musa paradisiaca* peel flour. However, no significant difference was observed between treatments ($p>0.05$).

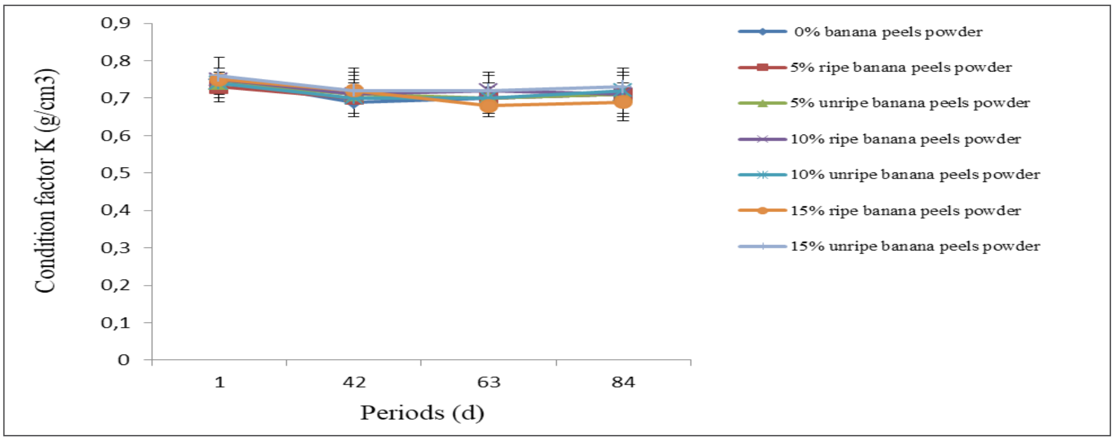

Figure 4. *Daily evolution of the condition factor K of Clarias jaensis juveniles as a function of the substitution levels of maize flour by ripe and unripe banana peels powder in the feed.*

3.1 Evolution of the Average Daily Gain of *Clarias jaensis* juveniles as a Function of the Substitution Levels of Maize Meal by Ripe and Unripe Banana Peels Powder in the Diet

The Figure 5 illustrates the evolution of the average daily gain of *C. jaensis* juveniles as a function of the substitution levels of corn flour by ripe and unripe banana peels powder in the diet.

From this figure, it can be seen that the average daily gain was decreasing for all feeds from day 1 to day 63, before increasing up to day 84. However, juveniles fed the diet containing 15% substitution of maize meal by ripe banana peels powder were higher, while those fed the diet with 5% substitution of maize meal by ripe peels powder and 10% substitution of maize meal by ripe peel powder were lower, with no significant difference ($p>0.05$).

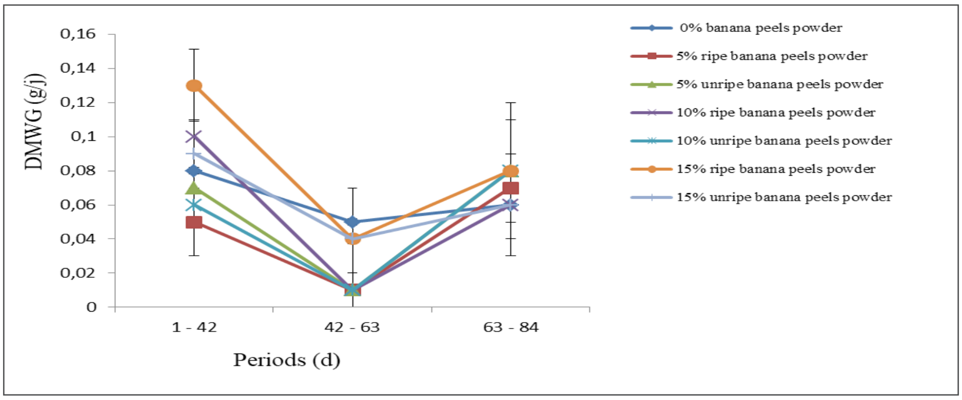

Figure 5. *Daily evolution weight gain of Clarias jaensis juveniles as a function of the substitution levels of maize flour by ripe and unripe banana peels powder in feed*

3.2 Daily Evolution of the Specific Growth Rate of *Clarias jaensis* Juveniles as a Function of the of Substitution Levels of Corn Flour by Ripe and Unripe Banana Peels Powder in the Feed

Figure 6 illustrates the daily evolution of the specific rate of *C. jaensis* juveniles as a function of the substitution levels of corn flour by ripe and unripe banana peels powder in the feed.

The figure shows that the specific growth rate decreased with time between days 1 and 63, before peaking between days 63 and 84. However, it was higher in juveniles fed at 15% level of substitution of maize meal by flour from ripe banana peels powder, followed by substitution of maize meal by unripe banana peels powder. It was lower in those fed at 5% level of substitution of maize meal by ripe banana peels powder in the feed.

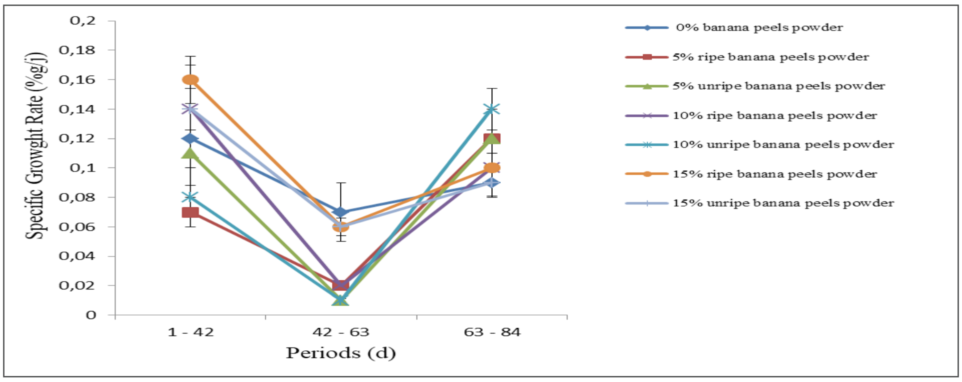

Figure 6. *Daily evolution of the specific growth rate of Clarias jaensis juveniles jaensis juveniles as a function of the substitution levels of maize meal by ripe and unripe banana peels powder in the feed.*

3.3 Evaluation of the cost of producing one kilogram of feed and the cost of the feed to produce one kilogram of *Clarias jaensis*

Table 4 summarizes the cost of producing one kg of feed and the price of feed for producing one kg of *Clarias jaensis*.

Table 4. *Production costs of one kg of feed and feed for one kg of C. jaensis as a function of substitution levels of maize flour by banana peels powder.*

Substitution levels (%)	Types of banana peels	UP (Fcfa)	CI	PF/kg (Fcfa)
0	-	520	1,6	832
5	RBPP	517,5	1,48	765,9
	URBPP	517,5	1,46	755,46
10	RBPP	515	1,37	705,55
	URBPP	515	1,37	705,55
15	RBPP	510	1,25	637,5
	URBPP	510	1,39	708,9

RBPP: ripe banana peels powder; URBPP: unripe banana peels powder; UP: price per kg of feed; CI: consumption index; PF/kg: price of feed to produce one kg of fish.

From this table, it can be seen that the cost of food to produce one kg of fish was higher for the 0% substitution of maize flour by ripe and unripe banana peels powder, and lower for the 15% substitution of maize flour by plantain ripe banana peels flour.

3.4 Summary of the survival and growth rate of *C. jaensis* juveniles as a function of the level of substitution of corn flour by ripe and unripe banana peels powder.

Table 5 presents a summary of the survival rate and growth characteristics of *C. jaensis* juveniles as a function of the level of substitution of corn flour by ripe and unripe banana peels powder in the feed.

Table 5. *Survival rate and growth characteristics of C. jaensis juveniles as a function of the substitution levels of corn flour by ripe and unripe banana peels powder in the feed.*

Survival Rate and Growth characteristics	Substitution levels (%) of Maize by ripe and unripe banana peels powder						
	0	5		10		15	
		RBPP	URBPP	RBPP	URBPP	RBPP	URBPP
SR (%)	100.00 ± 0.00^a	100.00 ± 0.00^a	100.00 ± 0.00^a	100.00 ± 0.00^a	100.00 ± 0.00^a	100.00 ± 0.00^a	100.00 ± 0.00^a
IMW(g)	63.40 ± 8.36^a	63.6 ± 10.6^a	64.33 ± 10.61^a	64.47 ± 7.88^a	63.67 ± 10.43^a	62.6 ± 8.42^a	62.03 ± 6.49^a
FMW(g)	69.07 ± 8.87^b	67.40 ± 11.14^b	69.07 ± 8.99^b	69.87 ± 8.81^b	67.73 ± 10.57^b	77.87 ± 4.69^a	67.80 ± 6,49^b
K (g/cm³)	0.71 ± 0.06^a	0.70 ± 0.04^a	0.71 ± 0.05^a	0.71 ± 0.07^a	0.72 ± 0.04^a	0.70 ± 0.04^a	0.73 ± 0.03^a
MWG (g/j)	0.07 ± 0.02^b	0.08 ± 0.04^b	0.06 ± 0.02^b	0.06 ± 0.03^b	0.05 ± 0.02^b	0.18 ± 0.13^a	0.07 ± 0.02^b
SGR (%g/j)	0.10 ± 0..02^b	0.05 ± 0.03^c	0.09 ± 0.01^c	0.10 ± 0.02^b	0.07 ± 0.02^c	0.27 ± 0.03^a	0.11 ± 0,04^b
CI	1.60 ± 0.04^a	1.48 ± 0.03^{ab}	1.46 ± 0.038^{ab}	1.37 ± 0.038^b	1.37 ± 0.04^b	1.25 ± 0.04^c	1.39 ± 0.03^b

RBPP: ripe banana peels powder; URBPP: unripe banana peels powder; CI: consumption index; IMW: initial mean weight; FMW = final mean weight; SGR: specific growth rate; (a, b, c): within the same line, values assigned the same letters are not significantly different (p<0.05).

Survival rate was higher in all treatments. Average final weight, condition factor K, average daily gain and specific growth rate were higher in batches fed 15% ripe plantain peel, followed by those fed 10% ripe plantain peel, with the lowest values obtained in batches fed 5% ripe plantain peel. As for the consumption index, it was significantly (p<0.05) higher with the food without plantain peels and lower with that with 15% incorporation of ripe plantain peels.

4. Discussion

The survival rate did not vary (100%) according to the type of food and the level of substitution of corn flour by ripe and unripe plantain peel flour. These values are comparable to 100% obtained by [9] in juveniles of *Clarias gariepinus* fed with Néréande meal. However, they were higher than 94.87 - 100% in soy-fed fish. These differences may be due to the physico-chemical conditions of the water obtained throughout the test period, and the species and size of the feed.

The average weight varied with the type of feed and the level of substitution of corn flour by ripe and unripe plantain peel flour. The highest average weight was obtained at 15% ripe dehusking (77.97 ± 4.69g), and lower in fish fed 5% ripe dehusking (67.4 ± 11.14g). The highest values (77.97 ± 4.69g at 15% ripe peel) were different from 48.74 ±11.4g obtained in juvenile Heteroclarias (*Heterobranchus longifilis x Clarias gariepinus*) fed the diet with 5% corn substituted by unripe plantain peel [10]. They also differed by 71.57±7.20 g in *Clarias gariepinus* juveniles fed the 100% corn-substituted plantain peel [11]. These differences are thought to be linked to the different species and strains of banana peel. The ability to withstand anti-nutritional factors would vary from one species to another.

The condition factor K varied with the treatments. The values obtained (0.70 - 0.73) were lower than 0.79 - 0.83 [12] in *Clarias gariepinus* receiving feed without maize substitution and 1.05 - 1.17 in *Clarias jaensis* in the wild [13]. The difference could be linked to the sub-optimal use of plant resources in rearing. Low weight growth could also be species-related.

The highest average daily gain of 0.18 ± 0.13 g/d was obtained with the 15% ripe plantain peel diet, which is lower than the 0.19 ± 0.31 g/d obtained by [4] in *Clarias gariepinus* fed the *Moringa oleifera* leaf diet and the 3.01 ± 0.04 g/d reported by [14] in the same species. On the other hand, the values obtained (0.05 0.18 g/d) were lower than 1.03 - 1.62g/d reported by [15] in *Clarias gariepinus* juveniles fed the 15% corn substitution diet with ripe and unripe plantain peels. The growth differences observed at the end of the assay could be linked to the species, size and physico-chemical conditions of the rearing water. They were also lower than 0.35 0 .45g/d [16] in *Clarias jaensis* juveniles fed feed composed of up to 20% *Desmodium uncinatumin.*

The specific growth rate was highest in batches fed the 15% maize-substitution diet with plantain ripe peel powder(0.27±0.03%g/d), followed by 15% unripe peel (0.11±0.04%g/d), the lowest being obtained with 5% ripe peel (0.05 ± 0.03%g/d). The values thus obtained (0.05 - 0.27%g/d) were lower than the 0.73 0.84 %g/d reported [16] in *Clarias jaensis* juveniles fed on feed compounded with *Desmodium uncinatumin* , also lower than 3.52 3.96 %g/d [17] for *Heterobranchus longifilis* juveniles fed a diet in which fish oil was substituted with palm oil; 2.50 2.68%g/d for *Clarias gariepinus* juveniles fed a diet in which corn was 100% substituted with ripe plantain peels [11]. These differences in values could be related to species, weight and feed. The lower Specific Growth Rate values in this study could be explained by the tannins contained in unripe plantain peels. Indeed, tannin is more concentrated in leaves than in stems [18].This high tannin content can reduce palatability ([19] and the nutritional value of the food.

The consumption index ranged from 1.25 to 1.6. It was lower in juveniles fed the 15% substitution diet of maize meal by ripe plantain peel meal, and higher in those fed the diet without plantain peel. However, whatever the type of food and the level of substitution, the values recorded remained lower than the 1.95 - 2.08 obtained by [20] to 1.41 - 1.80 reported by [21]. However, they were higher than 0.21 0.37 [22] in juvenile *Clarias gariepinus* fed on food containing ripe and unripe plantain peels up to 15% incorporation. This could be explained by the presence of anti-nutritional factors contained in plantain peels, and by endogenous (origin, strain, size, sex and age of subjects used) and exogenous (type of feed and physicochemical parameters of the environment) factors.

The price per kg of feed to produce one kg of fish decreased with the feed and level of substitution of maize by ripe plantain peelings. Thus, the feed containing 15% substitution of maize by ripe plantain peelings had the lowest feed cost (637.5 FCFA), indicating that it is the most economically efficient.

5. Conclusion

At the end of this study on the level of substitution of corn meal by ripe and unripe plantain peel meal on the survival rate and some growth characteristics of *Clarias jaensis* juveniles in tanks, the results obtained show that the feed containing ripe plantain peel had no effect on the survival rate of the fish. Growth and

Table I. Physicochemical characteristics of *Clarias jaensis* juvenile rearing water as a function of the level of substitution of corn meal by ripe and unripe plantain peel flour in the feed

Physicochemical Characteristics	Niveaux de de substitution (%) de la farine de maïs par la farine d'épluchures mûres et non mûres de banane plantain						
	0	5		10		15	
	-	RBPP	URBPP	RBPP	URBPP	RBPP	URBPP
Température (°c)	25,87 ± 0,81^{a}	25,43 ± 0,34^{a}	25,64 ± 0,51^{a}	25,91 ± 0,84^{a}	25,33 ± 0,81^{a}	25,57 ± 0,61^{a}	25,23 ± 0,42^{a}
pH (UI)	7,29 ± 0,20^{b}	7,56 ± 0,34^{b}	7,17 ± 0,30^{b}	7,64 ± 0,44^{b}	7,38 ± 0,23^{b}	7,74 ± 0,31^{b}	7,67 ± 0,42^{b}
Ammonia (mg/l)	0,05 ± 0,01^{c}	0,05 ± 0,01^{c}	0,05 ± 0,01^{c}	0,06 ± 0,01^{c}	0,05 ± 0,01^{c}	0,06 ± 0,01^{c}	0,05 ± 0,01^{c}
Nitrites (mg/l)	0,60± 0,01^{d}	0,06 ± 0,01^{d}	0,06 ± 0,01^{d}	0,07 ± 0,02^{d}	0,05 ± 0,05^{d}	0,06 ± 0,03^{d}	0,07 ± 0,01^{d}
Nitrates (mg/l)	14,91± 0,20^{e}	15,00± 1,29^{e}	15,87± 0,28^{e}	15,02± 0,20^{e}	15,11± 1,20^{e}	15,00± 1,26	15,01± 0,40^{e}

RBPP: ripe banana peels powder; URBPP: unripe banana peels powder, IU: International Unit.
(a, b, c, d, e): within the same line, values with the same letter are not significantly (p>0.05) different.

Figure I. *Juveniles of Clarias jaensis*

feed utilization characteristics remained superior in fish fed the 15% corn meal substitution diet with ripe plantain peel meal. It would be beneficial to use the 15% plantain peel substitute for maize meal as a feed for *Clarias jaensis* juveniles. It would be desirable to test the levels of ripe plantain peels above 15% on body composition in *Clarias jaensis*.

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