PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Pakistan Journal of Nutrition 9 (12): 1198-1202, 2010
ISSN 1680-5194

Influence of the Biotope on the Food Regime of *Chrysichthys ornatus* Boulenger 1902 and *Chrysichthys punctatus* Boulenger 1899 of the Basin of the Léfini River (Congo)

Christophe Ngokaka, Opoye Itoua, Fulbert Akouango, Victor Mamonekene and A. Ngoma
Farming Development Institute, Laboratory of the Animal Productions and Biodiversity,
University Marien Ngouabi, BP. 69, Brazzaville

Abstract: The objective of this survey was to know the influence of the biotope on the food regime of two species of catfishes of the basin of the Léfini river having an interest aquacade or economic. To arrive to this end, we captured and analyzed the stomachs of seventy six (76) specimens belonging to two species that are: *Chrysichthys ornatus* Boulenger 1902 (26 specimens) and *Chrysichthys puntatus* Boulenger 1899 (50 specimens). The two species have been captured in two different biotopes to know: the savanna and the forest. To appreciate the food régime according to these two biotopes, we calculated some parameters and food indications notably: the percentage of Occurrence (OC), the volumetric percentage (V) and the food indication (IA) of Lausanne. The done analyses show that the two studied species have a plastic food regime. This one varies according to the biotope. In savanna, the food regime of *Chrysichthys ornatus* has been varied more than in forest with a content stomacal where one identified eight (8) different preys against five (5) where dominate the scales cycloids with a percentage of occurrence of 75%. At *Chrysichthys puntatus*, on the other hand, the regime has been varied very in forest that in savanna with a content stomacal understanding five (5) types of preys against three (3) dominated by plant particles with a percentage of occurrence of 87%.

Key words: Catfishes, biotope, prey, scales cycloids

INTRODUCTION

Fish is a very important natural resource in tropical environment and to this title he has a reminiscent and mobilizing power that of other aquatic groups don't have. It is about a zoological group that presents the advantage to offer the varied biologic models and that has a patrimonial value recognized in some cases. He/it is also a group very threatened by the human activities. From where the necessity to know the biology and the ecology of these fish, particularly those to high value bargain.

The studies targeted on fish require research of accompaniment on their preys as well as on the surroundings in which they live, it following the place that they occupy in the networks trophiques (Daget *et al*., 1986, Leveque, 1994).

The catfishes are fish with naked skin provided with wattles. Their pisciculture, with the exception of some species as *Clarias gariepinus*, *Pangosius spp*, is not again to the point like the Cichlideses.

In pisciculture, the knowledge of the food regime of fish is necessary because the production depends on some. If food misses or if it is not appropriated, fish don't grow so much in captivity that in liberty. The administrators of the fisheries and the pisciculturists cannot ignore the relative problems to the food of fish. Besides, the persons responsible of the planning of the continental fishings use the knowledge of the nature of food, of the zones where one meets them in abundance to orient the fishers (Daget *et al*., 1991; Teugels *et al*., 1991).

It suits to recall that to Congo, very little study have been achieved on the food regime of the catfishes.

The present survey that constitutes a complement to the survey of the biology of these fish, aim to know the influence of the biotope on the food régime of two species of the basin of the Léfini river having an interest aquacole and economic.

MATERIALS AND METHODS

Localization of the survey zone: The analyzed specimens come from the captures achieved in the waters of the basin of the Léfini river. The Léfini river is an affluent of the Congo stream that is located in totality in the Trays téké as definite by Makany (1976) (Fig. 1).

Collection of the data: The present survey has been achieved during four expeditions. During this period, twelve (12) stations have been prospected of which six (6) in zone of savanna and six (6) other in zone of forest.

Corresponding Author: Christophe Ngokaka, Farming Development Institute, Laboratory of the Animal Productions and Biodiversity, University Marien Ngouabi, BP. 69, Brazzaville

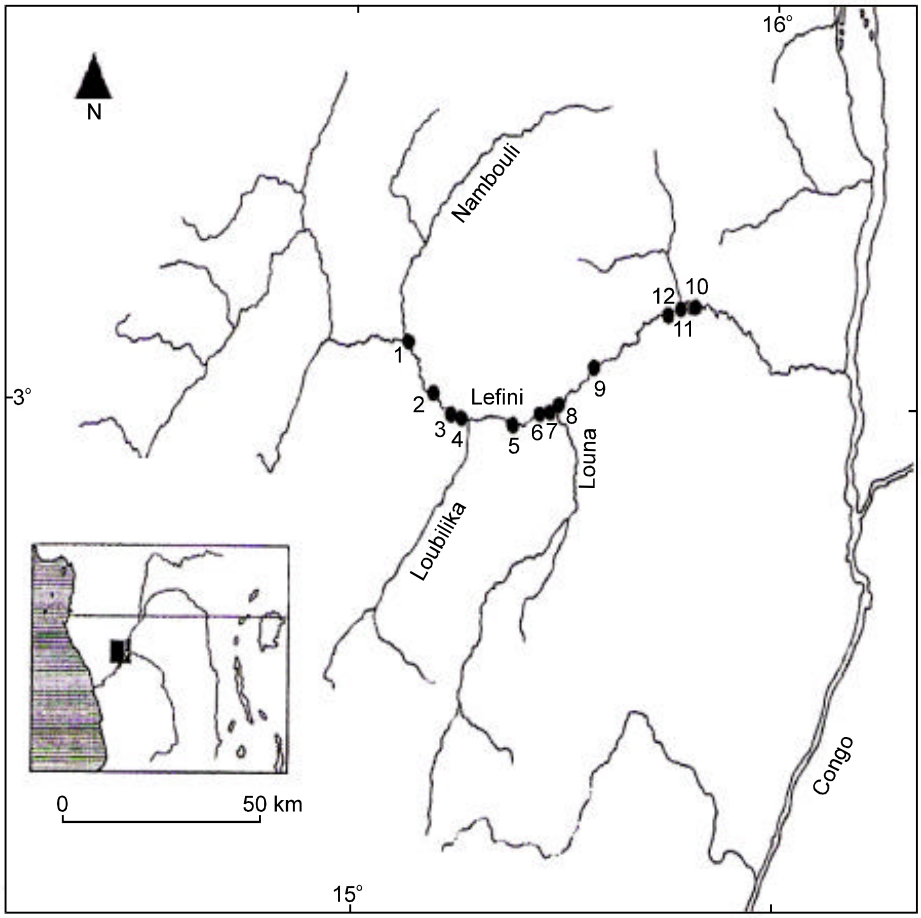

Fig. 1: Localization of the survey zone

These stations present the following features:

- Station n°1: Léfini river, Léfini-Nambouli confluent, left strand, bank to herbs, coordinates: 02°53.764'S; 015°06.846'E; altitude: 336m.
- Station n°2: Léfini river, 2.4 km upstream of the Malina camp, right strand, bank forest, coordinates: 02°59.231'S; 015°11.755'E; altitude: 318 m.
- Station n°3: Léfini river, more or less 3 km upstream of the LéfiniLoubilika confluent, right strand, bank forest, coordinates: 03°01.188'S; 015°14.239'E; altitude: 327 m.
- Station n°4: Léfini river, more or less of 2 km of the Loubilika upstream, strand left bank to herbs, coordinates: 03°01.356'S; 015°15.619'E; altitude: 336 m.
- Station n°5: Léfini river, more or less 3km upstream of the Mount Epopé, left strand, bank to herbs, coordinates: 03°01.971'S; 015°23.707E; altitude: 324 m.
- Station n°6: Léfini river, Mount Epopé, right strand, bank to herbs, coordinates: 03°01971'S; 015°23.707E; altitude: 324 m.
- Station n°7: Léfini river, Pool to snakes, right strand, 2 km upstream of the camp Project Protection Gorilla (PPG) Louna-Léfini confluent, bank forest; coordinated: 03°00.484'S; 015°28.869'E; altitude: 320 m.
- Station n°8: Léfini river, in front of the camp Project Protection confluent Gorilla, left strand, bank forest, coordinates: 02°59.649'S; 015°29.751'E; altitude: 321 m.
- Station n°9: Léfini river, Mondo camp, about 4km upstream of Mbouambé, left strand, bank forest, coordinates: 02°55.789'S; 015°34.570'E; altitude: 312 m.
- Station n°10: Léfini river, Obanga camp, downstream Mbouambé, right strand, bank to grass, coordinates: 02°49.084'S; 015°48.770'E; altitude: 303 m.
- Station n°11: Léfini river, to 600 m upstream of the Oténi camp, left strand, bank to herbs, coordinates: 02°49.480'S; 015°47.507E; altitude: 312 m.
- Station n°12: Léfini river, more or less 500m upstream of the Oténi camp, left strand, bank forest, coordinates: 02°50.251'S; 015°46.787E: altitude: 308 m.

Material of identification: For the identification of the preys contained in the stomachs, we used the material next one: a stereo microscope of mark Carl Zeiss; a foot to slide; a rule stepped up of 60 cm; a kit to dissection understanding a scalpel, of scissors, of the small pans in plastic; a balance of precision (0.01 g) having a range of 410 g; of the gloves made of latex; two glasses of watch' to put the content stomacal at the time of identification, in order to not to damage the stereo microscope, a test-tube of 1/10 ml of precision and a capacity of 10 ml permitting to have the volume of the preys considered; a syringe having a capacity of 1 ml with a precision of 1/100 ml for the obtaining of the volume of the smallest preys and the aluminum paper.

Method of identification of the preys: The used method is the one of the presence-absence of a type of prey in the stomachs, from which one calculates the percentage of occurrence that is the report of the number of stomachs where the prey is present in relation to the number of stomachs studied (Leveque, 1994).

After the opening of the stomach, the different preys have been identified with the help of the stereo microscope and the two volumes of Fauna and aquatic Flora of the Africa Sahélo-Soudanienne (Durand and Leveque, 1980; Leveque, 1994). once the identified preys, we weigh them and we take the volume of these. The weighing and the evaluation of the volume made themselves by categories of preys.

To appreciate the influence of the biotope on the food regime of the two species of the parameters and indications have been calculated. It is about the coefficient of emptiness and the food indication (IA) of Lausanne.

These parameters define themselves respectively of the following manner:

a) Coefficient of emptiness (V%):

$$V\% = \frac{\text{Number of empty digestive tubes}}{\text{Total number of tubes digestives examined}} \times 100$$

b) Food Indication (IA) of Lausanne:

The calculation of the indication food IA of Lausanne permits to use two methods:

The method of occurrence or percentage of occurrence that consist in enumerating the number of stomachs examined containing an i item given. She/it has for formula:

$$F = \frac{n_e}{N_t} \times 100$$

Where, n_e = number of stomachs containing the i prey; N_t = number of studied stomachs.

The ponderal method (p) or volumique (v) that consists to sort out then to determine the weight or the volume of every prey category for the whole sample. His/her/its formula is:

$$P = \frac{P_i}{P_t} \times 100 \quad \text{or} \quad V = \frac{V_i}{V_t} \times 100$$

Where, P_i = weight of the i preys and V_i = volume of the i preys; P_t = total weight of the preys and V_t = total volume of the preys.

The food indication of Lausanne (IA) that associates the food preferences of a species (F = frequency) and the relative importance of every category of preys (V = volume) has for formula:

$$IA = \frac{F \times V}{100}$$

This indication varies from 0 to 100
So, IA <10 it is about accidental preys,
10 <IA <25 the preys are non negligible,
25 <IA <50 it is about essential preys,
IA> 50 the preys are main.

RESULTS

Food regime of *Chrysichthys ornatus* Boulenger 1902 according to the biotope

Percentage of occurrence, volumetric percentage and food indication of the preys identified in savanna: The analysis has been made on twenty six (26) specimens of which ten nine (19) female and seven (7) males. On the set of the stomachs of studied fish for this species, eight (8) were empty and ten eight (18) contained preys of different natures, either a rate of emptiness of 30.76%. While examining the representative (Fig. 2) of the savanna, one notes that the food regime of *Chrysichthys ornatus* was qualitatively very rich and quantitatively. He/it was composed of eight types of preys: scales cycloids (75, 10.35 and 7.76%), the Décapodeses (25, 61.85 and 15.46%), larvas of Odonates (25, 20.61 and 5.15%), the plants (50, 2.06 and 1.03%), the non identified bugs (n.i) (25, 2.06 and 0.51%), the non identified preys (25, 1.03 and 0.25%), the larvas of bugs non identified (n.i) (25%) and finally the scales chéloïdes (25%).

Percentage of occurrence, volumetric percentage and food indication of the preys identified in forest: The Fig. 3, representative some forest shows that the food regime of *Chrysichthys ornatus* was qualitatively poor. He/it was composed of five (5) types of preys only: the fish-preys (66.66, 40.50 and 26.99%), the plants (66.66, 25.31 and 16.87%), the Décapodeses (33.33, 31.64 and 10.54%), the larvas of Odonates (33.33, 2.53 and 0.84%) and finally the feathers (33.33%).

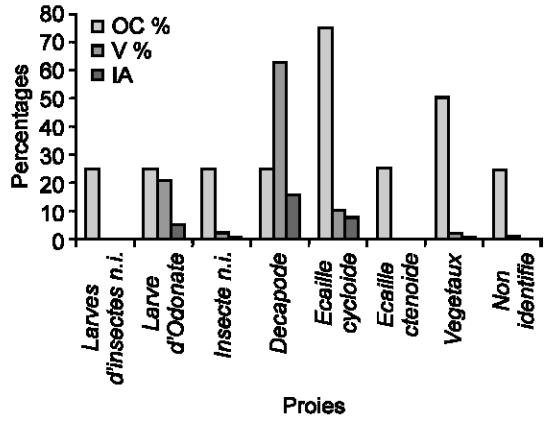

Fig. 2: Food specter of *Chrysichthys ornatus* in savanna

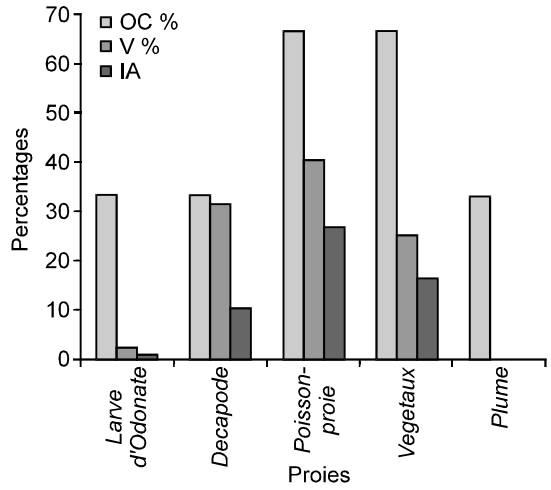

Fig. 3: Food specter of *Chrysichthys ornatus* in forest

Food regime of *Chrysichthys puntatus* Boulenger 1899 according to the biotope

Percentage of occurrence, volumetric percentage and food indication of the preys identified in savanna: The analysis has been made on fifty (50) specimens of which twenty six (26) female and twenty four (24) males. On the set of the stomachs studied for this species, twenty five (25) were empty and twenty five (25) contained preys of different natures, either a rate of emptiness of 50%.

The Fig. 4, representative some savanna shows that the food régime of *Chrysichthys puntatus* was so much qualitatively poor that quantitatively. He/it was composed of three (3) types of preys only: the larvas of Trichoptères (50, 100 and 50%), the plants (100%) and the scales cycloids (50%).

Percentage of occurrence, volumetric percentage and food indication of the preys identified in forest: The Fig. 5, representative some forest raises that five (5) types of preys have been identified composed of: plants

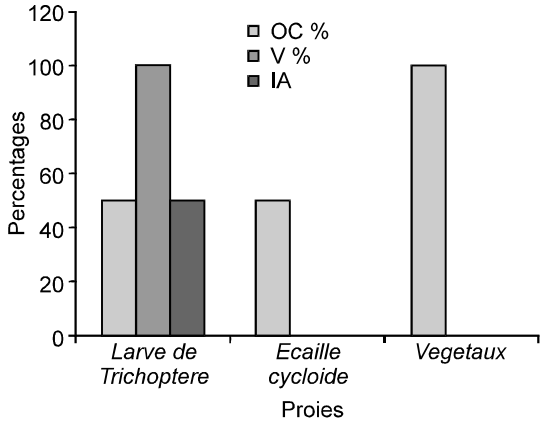

Fig. 4: Food specter of *Chrysichthys punctatus* in savanna

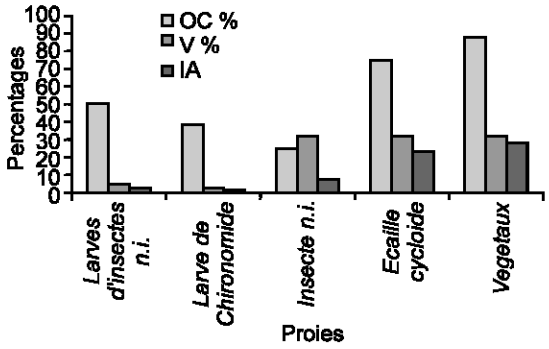

Fig. 5: Food specter of *Chrysichthys punctatus* in forest

(87, 31.57 and 27.62%), the scales cycloids (75, 31.57 and 23.67%), the non identified bugs (n.i) (25, 31.57 and 7.89%), the larvas of bugs non identified (n.i) (50, 5.26 and 2.68%) and finally the larvas of Chironomides (37.5, 2.63 and 0.98%).

DISCUSSION

Many researchers underlined the importance of the analyses stomacales to acquire valid and numerous knowledge on the food habits of fish and on the essential of their food.

Indeed, if the direct observation informs on the food habits, the nature of the preys absorbed and their possible repercussion on the habitat, one cannot get any precise information on the other hand on the plant and animal species constituent the food of a fish species, as well as on their relative importance that by an indirect method to know the analysis of the content of the digestive tube.

The exam of the contents stomacaux shows that the composition of the menu of the studied fish depends closely on the biotope. Indeed, this one is so much susceptible on the qualitative plan that quantitative to influence the development of the preys.

On the qualitative plan, one knows for example that the savanna and the forest are two different biotopes capable to encourage the types of preys differently. To suppose that the same types of preys develop themselves without distinction in the two surroundings, he/it is obvious that the fish who meet them in their habitat, will consume them without discernment. It is certainly the case of the larvas of Odonates, the Décapodeses and plants that develops himself at a time in savanna and in forest and that are identified in the digestive tubes of the two species in savanna and in forest. In the contrary case, if the biotope doesn't encourage the development of a prey given, it is obvious that such a prey won't be consumed except if fish does a migration in search of the favorite prey.

In addition to the qualitative aspect, the quantitative aspect also intervenes to orient the preferences of fish. Here the middle is put again, to strong contribution to justify the preferences of fish.

Indeed, a given middle can encourage the abundant development of individuals. In our case, one notes that every biotope tends to encourage the development of more than organisms of which eat fish in relation to the other. In these conditions, fish is going to consume as many preys as the nature placed at its disposal.

Thus, at *Chrysichthys ornatus*, the food regime has been varied more in savanna that in forest with eight (8) preys against five (5). On the other hand, at *Chrysichthys puntatus* one notes that the food regime has been varied more in forest that in savanna with five (5) preys against three (3) only in savanna.

Conclusion and perspectives: The survey of the food régime of the catfishes constitutes an element important of the knowledge of the biology of the freshwater fish of Congo in general and of the basin of the Léfini river in particular. She/it should allow term us to manage the stocks of this group better and to exploit it to good knowledge.

The done analyses show that the two studied species have a plastic food régime that varies according to the biotope. This situation seems to be bound to the presence and the abundance of food that, according to the cases, develop himself and accumulate in such biotope (savanna) or in such other (forest). The preferences observed for some preys by one or the other species seem bound also to the availability of these preys in the biotopes.

This survey should integrate other parameters as the seasons and the zones in order to have some points of support having to permit us to explain the variations of growth, some aspects of reproduction, the migrations and the behaviors of research and hold of food.

Otherwise, this analysis of contents stomacaux that informed us on the nature of the natural food as well as on the food habits of the studied species, could be completed by the experimentations on the nutrition of these species in order to see on the one hand what is the absorbed value nourishing of the various food, on the other hand what are the real food needs of these species. This acquaintance is us necessary to be able to estimate the capacity of production so much in fish of a stock determined of food in the nature that in raisings to compose highly nourishing rations.

ACKNOWLEDGEMENTS

The authors thank Mr. Serge Valentin PANGOU, Director of the Group of studies and Research on the Biologic Diversity (GERDIB) for the technical help that he/it brought to them, without forgetting Gentleman Jean DIAMOUANGANA, Mr. of Research, Isabelle MADY GOMA DIRAT Maître-Assistant to the Superior Normal School for their remarks.

REFERENCES

Daget, J., J.P. Gosse and D.F.E. Thys Van Den Audenaerde, 1986. Chek-list of the freshwater fishes of Africa. CLOFFA 2 (Bruxelles), M.R.A.C. (Tervuren), O.R.S.T.O.M. (Paris), pp: 520.

Daget, J., J.P. Gosse and D.F.E. Thys Van Den Audenaerde, 1991. Chek-list of the freshwater fishes of Africa. CLOFFA 2 (Bruxelles), M.R.A.C. (Tervuren), O.R.S.T.O.M. (Paris), pp: 740.

Durand, J.R. and C. Leveque, 1980. Flore et faune aquatique de l'Afrique sahélo soudanienne. Collection, initiations documentaires techniques N° 45, Tome 2, O.R.S.T.O.M., Paris, pp: 389.

Leveque, C., 1994. Introduction générale: Biodiversité des poissons africains. In: Teugels G.G. J.F. Guegan et J.J. Albaret (eds). Diversité biologique des poissons des eaux douces et saumâtres d'Afrique. M.R.A.C., Tervuren, Belgique, Ann., Scs. Zoo., Vol. 272, pp: 7-16.

Makany, L., 1976. Végétation des Plateaux tékés (Congo). Université de Brazzaville. Ed. jabard, France, pp: 301.

Teugels, G.G., J. Snoeks, L. De Vos and J.C. Diakanou-Matongo, 1991. Les poissons du bassin inférieur du Kouilou (Congo). In R.J. Dowsett et F., pp: 21-23.