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Toxicity test of some plant extracts of plants used in catching fish in Sankuru

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Summary: This study presents the results obtained in the context of a thesis on the evaluation of the toxicity and environmental impacts of three ichthyotoxic plants on Gambusiaaffinis (Blighiawelwitschii, Dyschoristeperrottetii and Millettiadyschesnei). The overall objective of this study is to evaluate the toxicity rate of ichthyotoxic plants Blighiawelwitschii, Dyschoristeperrottetii and Milletiaduchesnei on the health of aquatic ecosystems in general and populations of Gambusiaaffinis in particular. Samples of these three ichthyoxic plants were collected from the Lomela territory, Sankuru Province, and those from Gambusiaaffinis were collected from the Funa River, Kalamu Commune, Kinshasa, DRC.

The analyzes were carried out in ecotoxicological and ecosystem health laboratories of the Faculty of Sciences of the University of Kinshasa. The results of the analyzes revealed that Blighiawelwichii is toxic to biotest individuals in concentrations: 10-0, 10-1, 10-2, 10-3, 10-4 with 0% of survivors observed, followed by 66.7 % of the survivors observed in the concentration of 10-5 and with a lethal concentration of around 0.0000045 ml / ml, Milletiaduchesnei is toxic to populations of Gambusiaaffinis in these concentrations of 100 and 10-1 with 0% of survivors in each concentration, 10-2 and 10-3 with 66.7% of the survivors observed in each of concentrations and with a lethal concentration of around 0.0045ml / ml, Dyschoristeperrottetii is toxic to populations of Gambusiaaffinis in these concentrations: 10-0, 10-1, 10-2 with 0% of the survivors observed, and with a lethal concentration of around 0.00055ml / ml.

Keywords: ichthyotoxic plants, toxicity, Gambusiaaffinis

I. Introduction

The Democratic Republic of Congo (DRC) has many rivers and fish lakes with more than 26 families with about 720 species that, well exploited, could help solve the thorny problem of malnutrition that prevails in most Congolese households and, as a result, help efforts to fight poverty (MICHA, 2006).

The high demand for fishing products, linked to the rapid population growth in rural areas, explains the frequent use of fishing poison. For the population, the objective of this practice is to increase the volume of catches in order to respond adequately to the demand. However, this way of catching fish by poisons exposes to a great danger not only organisms or aquatic ecosystems, but also plants by direct diffusion through the leaf parenchyma of toxic gases or by stomatal breathing, by contact with the animals. aerial parts or by root absorption in cases of soil pollution and manipulators who can finally be contaminated if not by respiratory (inhalation), but also by trophic route (Ramade, 1977) (2). And for the latter, the population is mostly illiterate and not very aware of the danger it incurs, is often victim of biomagnification (MUSIBONO, 2017).

Faced with the effects of the economic crisis that has hit the DRC for several decades and the imperative of survival, the people of Lomela Sankuru, to self-suffice, also practice fishing. They use some poisonous plants that they use in an uncontrolled way to catch the fish. Indeed, the aquatic ecosystems of Sankuru, in general, and the territory of Lomela, in particular, have been subject for several years to numerous aggressions including: intensive fishing during drought, logging, various pollutions of water by organochlorine pesticides. In addition to these known practices, the population of Lomela is still intensely used, today, in fish fishing with ichthyotoxic plants such as: Okosokoso (Blighiawelwischii), Tshoko (Dyscharistperrottetii) and Kisi (Milletiaduchesneii) with the observed extermination of fish preludes a degree of poison, likely to damage the biodiversity and to break its ecological balance. Indeed, it should be noted, "the poison is a substance that causes alterations or disruption of the functions of the body leading to harmful effects, the most serious of which is obviously the death of the organism in question. These pollutants disrupt populations and communities, and not only by the detection of traces of certain substances that contaminate a given environment (RAMADE, Op.cit).

An imbalance can be observed when the quality of more or less toxic substances received is greater than the self-purifying capacities of the ecosystem. The elimination of pollutants is then no longer as effective and they tend at to accumulate in the environment and can become toxic to the species. Pollutants that are not or

little biodegradable such as macro-waste (plastics, glasses, etc.), metals or certain pesticides, disturb and amplify this phenomenon (MONOD, 1928).

In addition, it is certain that because of the large quantity of fish harvested, customary fisheries provide a significant contribution of animal protein to neighboring populations as well as those of neighboring towns. However, despite their traditional character and efficiency, these poorly controlled actions are not only beneficial; on the one hand, fish caught by poisoning are poorly preserved; their flesh is rapidly degraded and the sale of the product from these fisheries on the market cannot always be made in a short time. As a result, this often consumed food, which is often spoiled away from the fishing grounds, is not without risk for consumers. On the other hand, plant poisons, if administered orally, are extremely toxic, even at very low dilution and by simple contact for cold-blooded animals. All the organisms constituting the freshwater ecosystems are therefore likely to be affected because of the low selectivity of this product (ELOUARD, et al, 1982).

The extermination of fish thus found, through these poisonous plants, can be considered if not as a crime, but in any case as a means of massive destruction of aquatic biodiversity, since the fish are ruthlessly slaughtered without the less selection. Poisons also kill other organisms in the ecosystem, including the invertebrates that form the basis of the trophic chain of aquatic organisms. The use of poison plants, listed above, becomes commonplace at Lomela in Sankuru, despite the fact that scientific publications demonstrate the disadvantages and formally prohibit their use (RAMADE, Op.cit).

Clearly, the over-exploitation of fisheries resources with poisons entails costs for both the economy and the environment. Terminating them and giving the stocks time to replenish would increase productivity and maximize revenue over time for this sector. Such action is needed to stabilize both fishery resources and the fisheries sector. On the other hand, it is important to think about alternatives and compensatory measures by considering all the components (environmental, socio-economic, political, cultural ...) in order to find the solution that would be sustainable and effective.

In case of acute, sub-acute or long-term intoxication, the inhabitants of Lomela, like all good Africans, seek the origin of the evil rather in the supernatural than in reality itself. Hence the untimely resort to wizards. Such behavior seems not only irresponsible, but also harmful and destructive of human lives.

As part of this study, the main concern is to imbibe the degree of toxicity of ichthyotoxic plants, including: blighiawelwitschii (Okosokoso in Tetela), dyschoristperrottetii (Tshoko in Tetela) and milletiaduchesneii (Kisi in Tetela) on populations of Gambousiaaffinis and to identify the classes and subclasses of the natural (chemical) substances responsible for the toxicity, in order to assess their environmental impact.

Hypotheses

The population of Lomela practices traditional fishing with the use of plants Blighiawelwitschii (Okosokoso in Tetela), Dyschoristperrottetii (Tshoko in Tetela) and Milletiaduchesneii (Kisi in Tetela). This practice is toxic to aquatic species and contributes to the extinction of some species.

Objectives

The present work has a twofold objective: global and specific.

Overall objective

The overall objective of this study is to evaluate the rate of toxicity of plants as well as the classes of chemical substances of Ichyotoxic Blighiawelwitschii, Dyschoristeperrottetiiet and Milletiaduchesnei on the health of aquatic ecosystems in general and populations of Gambusiaaffinis in particular.

Specific objectives

The specific objectives of this work are:

- Determine the lethal dose for each ichthyotoxic plant in relation to the volume of water and time;
- Propose environmentally friendly fishing practices to the people of Senegal in particular and the DRC in general.

II. Study Environment, Material And Methods

II.1 Middle Of Study

Our study was carried out in Sankuru province which is one of the provinces created by the 2006 Constitutional dismemberment in its article 2 (constitution of the DRC 2006). It is an offshoot of the province of Kasai Oriental.

The province of Sankuru is located in the center of the Democratic Republic of Congo. It consists of six territories: Katako-Kombe, Kole, Lodja, Lomela (the territory where our research is centered), Lubefu,

Lusambo. The latter is the capital of the present province, while Lodja is the largest center of economic activity. The geographical coordinates are: 3 ° 21'27"sud, 23 ° 35'48 ". Its area is: 104,331 km^2.

Its relief is composed of low-lying plateaus, terraces and "high" plateaus located between 300 m altitude in the West and 700 m in the East. Most of the landscape is occupied by swampy lowlands or floodplains. In places, 80m high cliffs line the rivers (This section is largely from Evrard 1968. Geology and soils). The landscape is located entirely in the alluvial basin of the Congo. The youngest sediments are Pliocene, Pleistocene and Holocene. The oldest, which outcrop in the valleys, are of Cretaceous age.

In the East, in the South and in the Center of the Landscape, the soils are sandy or sand-clay (areno-ferrals and ferralsols). The valleys are covered with white sands while the marshy areas are covered by a horizon of little decomposed organic matter. In the lower part of the Landscape, to the north and north-west, the hydromorphic soils are dominant and cover more than 50% of the surface.

The average annual rainfall is 2,100 mm in the north and 1,700 mm near the Lukenie in the south. Monthly precipitation varies little but shows a slight decrease from June to August.

The northern half of the Landscape is drained to the northwest by more or less parallel rivers, including Lomela and Salonga. Tributaries of the Ruki that join the Congo River in Mbandaka. In the Southwest, part of the Landscape belongs to the Mai Ndombe Lake basin.

In the south, drainage is provided by the rivers Lukenie and Sankuru, tributaries of the Kasai which flows into the Congo River at Kwamouth. Most of the landscape is subject to significant seasonal flooding (www.beltrade- congo.be, the economic activity bulletin of the DRC, No. 16-OCTOBER / NOVEMBER 2009). The Landscape is part of the Central Congolese Forest ecoregion and is 94,4% covered by diverse forest formations which 23.6% swampy or floodable forests and 70.8% mainland forests that form a mosaic of or less evergreen (in the humid bottom) or deciduous (on the tops of plateaus and ridges).

Among the different formations, there are small areas of mono-dominated forest of *Gilbertiodendrondewevrei*, *G. ogoouense* or *Brachystegialaurentii*, semi-deciduous forests. From a demographic point of view, the data collected in 2006 shows: 1.007.000hab. (2006) with a density of: 9.7 hab / km; area: 104.331 km^2.

II. 2. Material and Methods

II.2.1 Material

A) Tools

For its realization, the present work requires a number of tools, such as notebooks, pens for taking notes, the camera for shooting, telephone and others such as jars, scales etc. listed in the table below:

N°	Description	Quantity	Nature
0.	cups	88	Plastic
1.	Pools	2	Plastic
2.	Bucket	1	Plastic
3.	Can	1	Plastic
4.	syringe of 10cc	10	
5.	Syringe of 20cc	5	

b) Biological material

We will limit ourselves to the few ichthyotoxic plants of Sankuru, precisely taken from the territory of LOMELA including Blighiawelwitschii (Okosokoso), Dyschoristperrottetii (Tshoko), and Millettiaduchesnei (Kisi) and Gambusiaaffinis fish harvested in the Funariver in Kinshasa.

b.1. ichthyotoxic plants

at. Blighiawelwischii (Okosokoso),

Blighiawelwitschii is a genus of trees of the sapindaceae family. It includes several species native to tropical Africa. Se from Sierra Leone to Uganda and south to DR Congo and northern Angola. It is rarely found in, for example, botanical gardens (Aubréville, 1959).

Blighiawelwitschii is usually found in moist evergreen forest, in primary as well as secondary forest, but also in semi-deciduous forest. In Uganda, it is present up to 1150 m altitude.

As for our samples, we collected them in the virgin forest in Onyangondo village. The part used is the fruit.

According to the botanical classification, Blighiawelwitschii is from the Reign of plantae, under reign of tracheobiona, division of magnoliophyta, class of magnoliopsida, subclass of rosidae, order of sapindales, family of sapindaceae, genus blighia, and the species it is Blighiawelwitschii (Penders, A. &Delaude, C., 1994). The following image illustrates the photos of Blighiawelwitschii,

Photo 1 et 2: Blighiawelwitschiifruit deBlighiawelwitschii
Source: Vivien, J. & Faure, J.J., (1985).

b. DyschoristeperrottetiiNees (TSHOKO)

It is a suffrutescent grass, erect or ascending, branched, reaching 1m high. Leaves opposite, petiolate, elliptic to oblanceolate, glabrous to subglabrous, narrowed towards both ends, up to 8-10 cm long and 2-3 cm wide; pinnate venation with 6-8 pairs of lateral veins. Flowers sessile to subsessile, grouped into axillary glomeruli by 3 or more; calyx with filifome lobes, ciliate; corolla 8mm long, pale purple, 2-labiate. Capsular fruit, 1cm long, terminated by a rigid tip.

Habitat. Wetlands in savannah; river banks, ruderal places.

According to its botanical classification, Dychoristperrottettii is from the reign plantae, sub-kingdom of tracheobionta, division of magnoliophyta, class: magnoliospida, subclass of rosidae, order of fabales (butterflies), family of fabaceae or papillonaceae, genus: Dyschorist and species DychoristeperrottettiiNees. (Source: Fouarge, J. & Gerard, G., 1964).

The following photo shows the image of Dyschoristperrottetii, photographed in the village of Onyangondo in the territory of Lomela on 09/02/2019).

Photo3 et 4: images DyschoristperrottetiiNees

c. MillettiaDuchesnei

Liana banded, up to 20 cm wide, 3 cm thick and rising to the top of tall trees, sometimes shrub 2 cm tall; flowering twigs 4-6 mm in diameter, pubescent then glabrous, with very small elongated lenticels.

Leaves 3-4 (5) - judged; petiole more or less angular, 4-12cm long, usually glabrous and rachis 6-14 cm long, canaliculate, sometimes pubescent; leaflets with petiolules pubescent or glabrous, more or less 5mm long; it is filiform, 4-5 mm long; blade ovate or obovate, abruptly acuminate, obtuse, 5-12 cm long, 1 of which is acuminate, and 2-5 cm wide, fairly high above, with dense hairs fairly dense in the young state below and sometimes a little silky, then almost glabrous and dull, with 6-7 pairs of secondary veins. Inflorescence terminal, spiciform, simple, erect, rigid, 15-45 cm long and 1.5 wide, or branched, shoots distich-like, little divergent, 10-15 cm long; brown axes with short hairs, more abundant on the young parts and continuing even on the chalice (Gilbert, G & al, 1954).

These samples are still harvested in LOMELA territory. This species is more domesticated in the area of BAKUTSHU. We collected our samples in the farmers' fallow land.
Distribution: Central Forest (Yangambi, very common:
Habitat: primary forest, the banks of the river, flowers from April to December;
Vernacular name: Bolikibolokele (Turumbu dialect)
Observation: vine with vessels visible to the naked eye and secreting a red resin by the wounds (INEAC 1954).
The following photo shows the image of *Milletiaduchesne*i, photographed in Mamba village in Lomela territory

Photo 5: image of MillettiaDuchesnei

According to the botanical classification, MillettiaDuchesnei is from the reign plantae, sub-kingdom of tracheobionta, division of magnoliophyta, class of magnoliospida subclass of rosidae, order of fabales (butterflyaceae), family of fabaceae, genus: Millettia and non The species is MillettiaDuchesnei.

b.2. Individual test (*Gambusiaaffinis*)

Gambusiaaffinis is a robust species living in all kinds of small ponds, ditches and marshes. "It is the best-known larvivorous fish (Gerberrich& Laird, 1985, Kramer et al., 1988, Walton &Mulla, 1991). In addition, G. affinis was also selected as a model organism showing a high reactivity to different pollutants, especially agricultural pesticides "(Boyd & Ferguson, 1964) cited by Hayette BELDI 2007). It frequents shallow waters, dormant or weakly common (streams, rivers), often ephemeral, warm and rich in vegetation (BRUTON, 1988). These are euryhaline and eurythermal species that adapt to all abiotic factors, unfavorable climatic and hydrological conditions, and even considerable changes in water.

Females, which can reach 8 cm in length, have a rather stocky body, with a clear abdominal task when they are full (gravid). It marks the location of the ovary by transparency (Brusle and Quigard, 2001). The color is yellowish, with light gray in the ventral region. Some black spots may be visible on the back and flanks and on the fins which are colorless. Their survival is very long since a female can be the object of 4 to 5 successive gestation without new insemination. The duration of gestation is quite variable. It is of the order of 25 days in the case of short pregnancies and 35 days for the longest ones.
Life time: 2 years
Habitat: freshwater, brackish water
Lifestyle: like to live in a bench
Depth of life: surface and medium

II.2.1.1.2. Method

a) Sample Harvest

The samples of the ichthyotoxic plants were collected each in their ecological environment, according to whether one was in the virgin forest, in domesticated forest or the vegetable gardens.

Herbarium collections were systematically carried out for each of them, we sent them to the herbarium of the University of Kinshasa for the identification of scientific names.

For Blighiawelwitschii, samples were harvested from primary forest in several villages in Lomela territory. The part sought and used by the villagers as ichthyotoxic was the fruit. We have collected a good amount of the fruits and have exposed them in the open under the shading for a certain time so as to reduce the humidity and especially to avoid the fermentation of the product.

For Dyschoristperrottetii, they are domesticated behind every peasant house of the Lomela villages. Our samples are harvested from several villages in the Bahamba I area. The farmers use the leaves and their stems as ichthyotoxic. These leaves are harvested, pounded and immersed in a body of water, whether stagnant or flowing water. We also made herbaria of this species that we kept in the same way as Blighiawelwitschii.

When Milletiaduschesnei, the part used as ichthyotoxic is the root. These meadows were also dried in open air under shade. We collected our samples in the fallow land of the peasants. It is rare to meet them in the vicinity of the houses, because the species is considered very toxic even for humans and domestic animals. Beside, we collected a good amount of the roots for the studies at ecotoxicology and ecosystem health laboratories of the University of Kinshasa, precisely at the Faculty of Science.

Arrived at the laboratory, we placed the samples in an oven at 40 ° C for a week to dry the water. The samples were ground separately, depending on whether one is with leaves, fruits or roots. These flours are weighed separately.

The water used was the water of the Régideso. This water should be well ventilated in basins for the declorée; at room temperature and at the pH of the aquarium water where the fish are kept (acclimate).

Fishing at Kalamu River (at first Limete Street). Using a dip net attached to a rod allowed the capture of Gambusiaaffinis. The dip net (trap) has the conical shape, was placed in the path where the fish pass. After moving the water, the fish wanting to escape are trapped; we collected the clear water from the middle, in a container (bucket of 15 liters) to preserve the captured fish; at the end of the fishery the fish are transported to the Ecotoxicology, Ecosystem Health, Environmental Microbiology and Biotechnology Laboratory.

The fish caught were acclimatized for two days (or 48 hours) under laboratory conditions in two 30-liter plastic pools of declogged tap water (declorinated tap water, i.e. water collected from the tap and kept open for a day or twenty-four hours under open-air laboratory conditions).

b) Preparation of the mother solution of poisons

The process is the same for all samples.

After grinding, the samples were sieved and weighed. To prepare the mother solution, 100 g of powder for diluting in 1000CC of water was taken to rest for 24 hours. Then filtering poison juice. From this mother solution, various solutions for the test are prepared. These solutions are:

10^0: stock solution (solution 0),
10^{-1}: 10 CC of the stock solution + 90 CC of water (solution 1),
10^{-2}: 10 CC of the solution 1 + 90 CC of water (solution 2),
10^{-3}: 10 cc of solution 2 + 90 cc of water (solution 3),
10^{-4}: 10 CC of solution 3 + 90 CC of water (solution 4),
10^{-5}: 10 cc of solution 4 + 90 cc of water (solution 5),
T: 100 CC of dechlorinated water (control).

With cups, previously labeled according to the number of samples and replicates per sample, there was a total of 21 tests per sample, including 3 replicates per solution. Thus for the three ichthyotoxic plant samples, we had to carry out 63 tests.

However, each attempt received 3 Gambusiaaffinis fish to observe them 30 minutes after trying, for the first time and stays of times each day at the same time during 4 days.

III. Results and Discussion

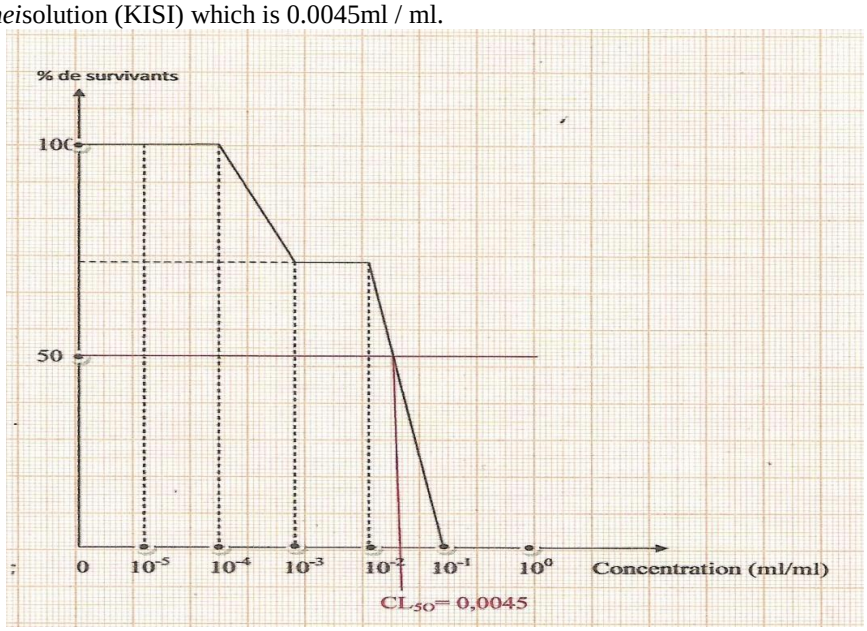
III.1. Results

The biotest results counting the number and percentage of *Gambusiaaffinis* survivors in the Milletiaduchesnei solution (KISI) are shown in Table 2 below.

Table 2: Number and percentage of Gambusiaaffinis survivors in the Milletiaduchesnei solution (KISI)

Solution in ml	Number of deaths				Number of living	% of the living
	1st day	2nd day	3rd day	4th day		
10^0	3	-	-	-	0	0
10^{-1}	3	-	-	-	0	0
10^{-2}	1	0	0	0	2	66,7
10^{-3}	0	0	1	0	2	66,7
10^{-4}	0	0	0	0	3	100
10^{-5}	0	0	0	0	3	100
T	0	0	0	0	3	100

The following graph illustrates the LD50 of *Gambusiaaffinis* individuals in the *Milletiaduchesnei*solution (KISI) which is 0.0045ml / ml.



The KISI solution is toxic to *Gambusiaaffinis* populations in these concentrations of 10^0 and 10^{-1} with 0% survivors in each concentration, 10^{-2} and 10^{-3} with 66.7% of the survivors observed in each of concentrations and with a lethal concentration 50 around 0.0045ml / ml.

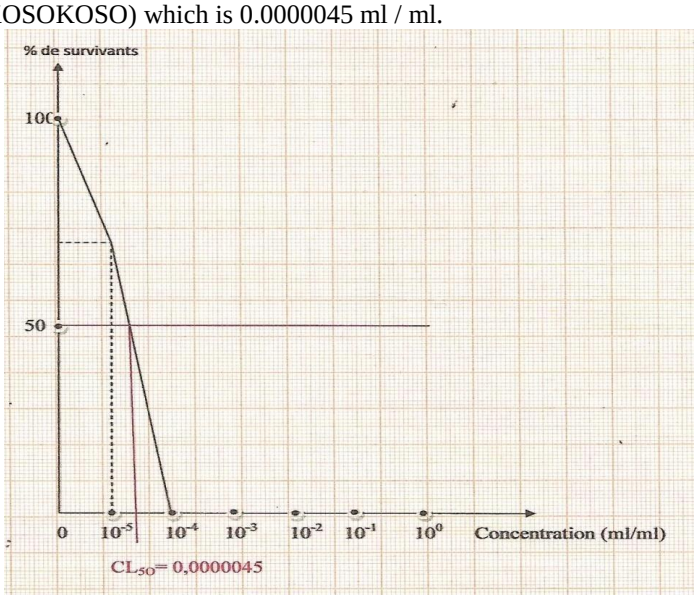
The biotest results counting the number and percentage of live *Gambusiaaffinis* in the solution of Blighiawelwitschii ('OKOSOKOSO) are shown in Table 3 below.

Table 3: Number and percentage of *Gambusiaaffinis* survivors in the solution of *Blighiawelwitschii* ('OKOSOKOSO)

Solution in ml	Number of deaths				Number of living	% of the living
	1st day	2nd day	3rd day	4th day		
10^0	3	-	-	-	0	0
10^{-1}	3	-	-	-	0	0

10^{-2}	3	-	-	-	0	0
10^{-3}	3	-	-	-	0	0
10^{-4}	3	-	-	-	0	0
10^{-5}	1	0	0	0	2	66,7%
T	0	0	0	3	3	100

The following graph illustrates the L50 of *Gambusiaaffinis* individuals in the solution of *Blighiawelwitschii* ('OKOSOKOSO) which is 0.0000045 ml / ml.



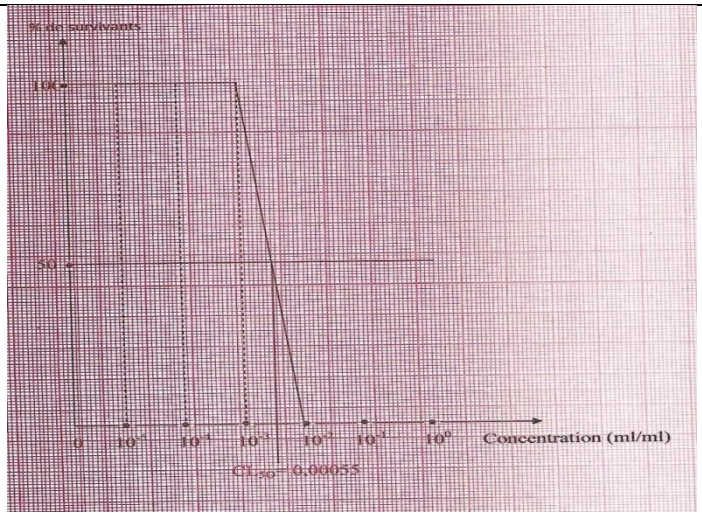
OKOSOKOSO solution is toxic to *Gambusiaaffinis* populations in these concentrations: 10^{-0}, 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4} with 0% of survivors observed, followed by 66.7% of survivors observed in the concentration of 10^{-5} and with a lethal concentration around 0.0000045 ml / ml.

The biotest results counting the number and percentage of the live *Gambusiaaffinis* in the solution of *Dyschoristeperrotteti* (TSHOKO) are shown in Table 4 below.

Table 4: Number and percentage of *Gambusiaaffinis* survivors in the solution of *Dyschoristeperrotteti* (TSHOKO)

Solution in ml	Number of deaths				Number of living	% of the living
	1st day	2nd day	3rd day	4th day		
10^{0}	3	-	-	-	0	0
10^{-1}	3	-	-	-	0	0
10^{-2}	3	-	-	-	0	0
10^{-3}	0	0	0	0	3	100
10^{-4}	0	0	0	0	3	100
10^{-5}	0	0	0	0	3	100
T	0	0	0	0	3	100

The following graph illustrates the LD50 of Gambusiaaffinis individuals in the *Dyschoristeperrottetii* solution which is 0.00055ml / ml



The solution of *Dyschoristeperrottetii* is toxic to populations of *Gambusiaaffinis* in these concentrations: 10^{-0}, 10^{-1}, 10^{-2} with 0% of the survivors observed, and with a lethal concentration 50 around 0.00055ml / ml

IV. Discussion

It is clear from the results of biotests, which showed that the LC50 are of the order of: 0.0045ml / ml (45.10-4), 0.0000045 ml / ml (45.10-7), 0.00055ml / ml (55.10-5), successively, Milletiaduchesnei, Bighiawelwtsichii and Dyschorsteperrottetii.

This explains why a concentration of 45.10-4 Milletiaduchesnei, 45.10-7 Blighiawelwitschii and 55.10-5Dyschoriste perrottetii kill 50% of individuals *Gambousiaaffinis*, which is an aquatic species deemed resistant, even in the most polluted waters. This is why Boyd & Ferguson (Op.cit) quoted by Hayette BELDI (Op.cit) asserts that *G. affinis* was also selected as a model organism showing a high tolerance to different pollutants, especially agricultural pesticides. And yet, the practice of ichthyotoxic is customary for the population of Lomela and even for all Sankuru. This way of doing things is without harmful consequences. Although J. KERHARO et al argue in their work "ichthyotoxic plants" that the risks of eating a poisoned fish are in most cases absolutely safe. On the other hand, the analysis carried out in this study reveals that this practice is very toxic for the health of exposed individuals. However, the same authors still maintain that "the plants thus used, whose judicious choice gave the user a severe work of discrimination between the various possible poisonous plants, gave birth; whether we like it or not, to a special class of poisons: fishing poisons ".

The results of our study confirm our initial hypothesis that "the population of Lomela practices traditional fishing with the use of plants *Blighiawelwitschii* (Okosokoso en Tetela), *Dyschoristeperrottetii* (Tshoko in Tetela) and *Milletiaduchesneii* (Kisi en Tetela). This practice is toxic to aquatic species and may contribute to the disappearance of certain species.

Conclusion and suggestions

At the end of this study whose overall objective is to evaluate the toxicity rate of *ichthyotoxic plants Blighiawelwitschii, Dyschoristeperrottetii*and*Milletiaduchesnei* on the health of aquatic ecosystems in general and populations of *Gambusiaaffinis* in particular.

And specifically, we set out to determine the lethal dose for each ichthyotoxic plant in relation to the volume of water and time and to propose aquatic environmentally friendly fishing practices of Sankuru in particular and the DRC in general.

With regard to the toxicity rates of these three ichthyotoxic samples against *Gambusiaaffinis* individuals, it was clear that:

- *Blighiawelwitschii* is toxic to biotest individuals in concentrations: 10^{0}, 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4} with 0% of survivors observed, followed by 66.7% of survivors observed in the concentration of 10^{-5} and with a lethal concentration of around 0.0000045 ml / ml,
- *Milletiaduchesnei* is toxic to populations of *Gambusiaaffinis* in these concentrations of 10^{0} and 10^{-1} with 0% survivors in each concentration, 10^{-2} and 10^{-3} with 66.7% of the survivors observed in each concentration. and with a lethal concentration of around 0.0045ml / ml,

- *Dyschoristeperrottetiiest* toxic to populations of *Gambusiaaffinis* in these concentrations: 10^{-0}, 10^{-1}, 10^{-2} with 0% of the survivors observed, and with a lethal concentration 50 around 0.00055ml / ml.

Given their degree of toxicity, *Blighiawelwitschii* is more toxic to populations of *Gambusiaaffinis* with an LC50 around 0.0000045 or 45.10^{-7}ml / ml, followed by *Perrottettidyschorist*with an LC50 around 0.00055 or 55.10^{-5} ml / ml and finally, *Milletiaduchesnei* with an LC50 around 0.0045 or 45.10^{-4}ml / ml.
Reading the above, it is essential to:

- involve the state service through the establishment of a sanitation brigade to control all cases of abuse of ichthyic ichthyes;
- Promoting ecological fishing that respects the environment, through popularization and public awareness activities to discourage the use of ichthyotoxic fish;
- Encourage fish farming activities with the aim of guaranteeing food security in the countryside;
- Continue research on the harmful effects of eating fish from poison with plant fisheries.

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