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Preliminary Data of Flyng Insects in Aquatic Ecosystem: Ngatsouéné and Yo in Djambala (Department of Plateaux, Congo Brazzaville)

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Abstract

Insects represent an important taxon for the functioning of ecosystems. They also contribute to human and animal nutrition and are vector agents of several diseases. In Congo-Brazzaville the diversity of entomofauna is very little known. The present study aimed to investigate ponds. The inventory of insects was conducted in ponds Ngatsouéné and Yo, the first one was located in the center of Djambala and the last one was 2 km from the center of the city. The insects were caught with an entomological net from 23rd to 24th December 2012. The study identifies 37 species belonging to 17 families and 7 orders. This entomofauna study showed a high proportion of the Orthoptera order (27.20%). Family Mantidae has the largest species number (13.51%). *Mantis sp* is the most abundant species (13.51%). This is a database and therefore, should be extended to different aquatic ecosystems of the Department of Plateaux. The results obtained during this study will contribute to the development of a database for the management of entomofauna in Congo.

Keywords

Djambala, Pond, Entomofauna, Species Richness, Ngatsouéné, Yo

1. Introduction

Insects represent the most important group because 4/5 of the animal species are currently known. However, the insects are the most well-known animal group on the planet. It is estimated that exist on earth over a million species of insects, while about 892,000 species have been described [1]. Insects are important in nature.

They participate in the pollination of plants, humus soil formation, and material recycling. In the area of health, they are vectors of parasitic agents in humans and animals (trypanosomiasis, malaria, filariasis), and others spread foodborne pathogens. In agriculture, they cause havoc to crops. In food, insects are rich in protein, vitamins and minerals and are important sources of iron, and vitamin B [2]. Aquatic insects play an important role in the functioning of aquatic ecosystems [3].

Among aquatic ecosystems, the pond is a vital network for maintaining the metapopulation of many species and represents an essential medium for the preservation of protozoa, aquatic insects, mollusks, amphibians, fishes and aquatic reptiles [4]. In Congo Brazzaville, some fragmentary insect studies have focused particularly on terrestrial insects by various authors [5]-[10]. The study on aquatic insects was conducted on the macroinvertebrates of Djoumouna River [11]. Moreover, the implementation of important works during the accelerated municipalization in recent years in most departments of Congo Brazzaville will have many consequences on surrounding ecosystems. Indeed, major refurbishments in the country (construction of roads and bridges, airports, public buildings, stadiums) lead to the destruction of fauna and flora. The study of the entomofauna of two ponds (Ngatsouéné and Yo), located in the center of Djambala city in the Plateaux Department was completed. It aims to achieve the physicochemical study of water, inventory, and identification of insects.

2. Materials and Methods

2.1. Sampling Area

Identification of flying insects of aquatic plants was investigated in two ponds: Ngatsouéné and Yo. These ponds are located in the center of Djambala, at 02˚32'42.3" south latitude and 014˚45'6.59" E longitude. It shows two areas: a central area consisting of a grove and an exclusively savannah area in which the survey was conducted. Geographic references of: (location outskirts of center of Djambala, 02˚31'8.39" South latitude and 014˚46'6.29" East longitude). Both pools were separated by about 1 km (**Figure 1**), were characterized by the same vegetation, depth varies between 1m and 1.5 m.

2.2. Physico-Chemical Analysis of Surface Water

Physico-chemical parameters were measured using an apparatus multiparameter Hanna: the water temperature and the air temperature, the conductivity, the pH (potential of hydrogen), TDS (total dissolved solids). Insects were captured from 23 to 24 December 2012.

2.3. Capture Techniques and Species Identification

The flying insects located on the plants were collected by hand or using the entomological net. Captured insects were photographed and fixed in alcohol 70˚. These insects were identified using the keys proposed by different authors [12]-[15].

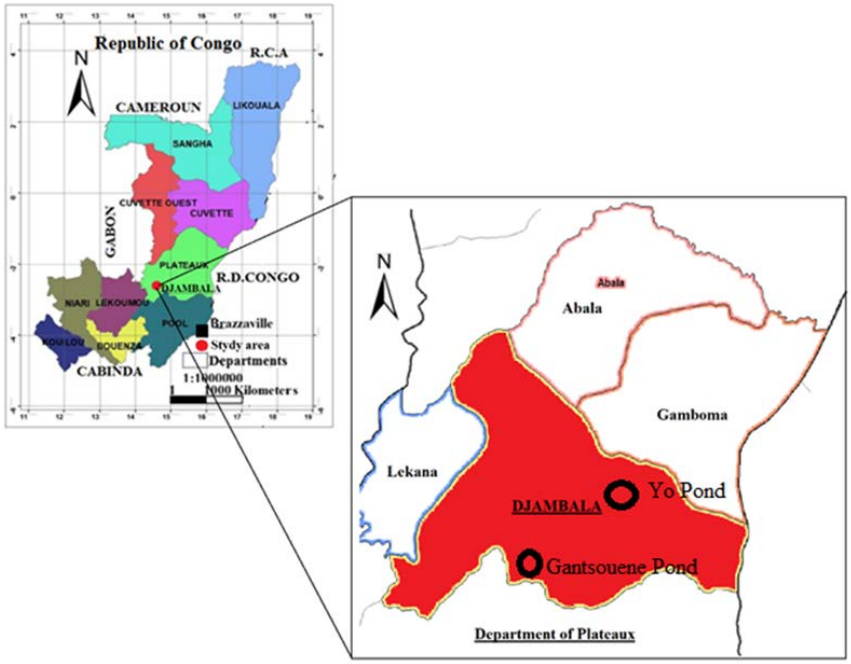

Figure 1. Location of the sampling area.

3. Results and Discussion

3.1. Physico-Chemical of Surface Water

The physico-chemical parameters of the water ranged between the two ponds. In the Yo pound, the pH was 6.1, the conductivity was equal to 29 µS/cm, TDS 14 ppm, the water temperature 28.23˚C and the air temperature 27.23˚C. Physico-chemical parameters values were measured in the Ngantsouéné indicate the following values: air temperature equal to 24.8˚C, water temperature equal to 24.9° C, a pH of 5.61, a conductivity of 18µS/cm, a TDS of 9ppm. The low conductivity of the water of Ngatsouéné and Yo indicates that these two ponds are poor in dissolved minerals. These results are similar to those found by [16] who found an acid pH (5.33) and a low conductivity (8.70 µS /m) in the Léfini River. By cons, in Nkéni River, they found almost the same value, an acidic pH (5.03) and low conductivity (8.68 µS/cm). Similar results were found in the Léfini River a pH of 5.6 and a conductivity of 7.9 [17]. The slight difference observed between pH, conductivity and turbidity values of the two ponds can be explained by the fact that in the Yo pond, is more frequented by populations who come from the fields and use soaps for cleaning their clothes and dishes.

3.2. Specific Composition of Insects Identified

The inventory of flying insects in two ponds Ngatsouéné and Yo, reported 37 species belonging to 17 families and 7 orders. The same species were found in both ponds; this implies that there is an interconnection between these two ponds. Each species is identified by its scientific name and common name in Téké language (Table 1). Some pictures of the insects collected are recorded in Figure 2.

Table 1. Specific composition.

Order	Family	Species	Name in Téké language
Odonata	Libellulidae	1-*Orthetrum sp*1	Momvimvi
		2-*Orthetrum sp*	
Mantoptera	Mantidae	3-*Mantis sp*1	Sonokoto
		4-*Mantis sp*2	
		5-*Mantis sp*3	
		6-*Mantis sp*4	
		7-*Mantis sp*5	
Orthoptera	Tetrigidae	8-*Tetrix sp*	Ampé
	Acrididae	9-*Schistocerca sp*1	Ampé
		10-*Schistocerca sp*2	
		11-*Schistocerca sp*3	
		12-*Schistocerca sp*4	
	Gryllidae	13-*Gryllus sp*1	Nzenze
		14-*Gryllus sp*2	
Diptera	Pyrgomorphidae	15-*Zonocerus variegatus*	Ampé ntsoune
		16-*Zonocerus sp*2	
		17-*Zonocerus sp*3	
	Calliphoridae	18-*Lucilia sp*1	Nguingui
		19-*Lucilia sp*2	
Hymenoptera	Apidae	20-*Apis sp*1	Gnoun
		21-*Apis sp*2	
		22-*Melecta sp*	
	Sphecidae	23-*Sceliphron sp*1	Ingahien
		24-*Sceliphron sp*2	
	Formicidae	25-*Formica sp*1	
		26-*Formica sp*2	
	Megachilidae	27-*Megachile sp*	
Coleoptera	Coccinellidae	28-*Epilachna sp*1	Ekoto ki manza
		29-*Epilachna sp*2	
		30-*Epilachna sp*3	
	Lycidae	31-*Calopteron sp*1	
		32-*Calopteron sp*2	
	Meloïdae	33-*Mylabris*	
	Cerambycidae	34-*Ceroplesis*	
Heteroptera	Coreidae	35-*Amorbus sp*	Ekoto
	Pentatomidae	36-*Biprorulus sp*	Ekoto ki ntsoune ki manza
		37-*Gonopsis sp*	
7	**17**	**37**	

Figure 2. Pictures of collected insects.

3.3. Spectrum of Insect Species Richness According to the Orders

The proportional distribution of species richness of insects according to the orders is shown in **Figure 3**. The order of Orthoptera is the most represented with 10 species or 27.02 %, followed by Hymenoptera (8 species or 21.62%), Coleoptera (7 species or 18.91%), Mantoptera (5 species or 13.51%), Heteroptera (cash or 08.10%). Diptera and Odonata are orders less represented each with 2 species (5.40%). These results differ from those obtained by [15] on the Djoumouna River that identified 34 families of insects belonging to seven orders. Diptera and Coleoptera are the largest orders. This difference may be explained by the fact that the

studies were conducted in different ecosystems; Djambala being located on a plateau 789 m above sea level.

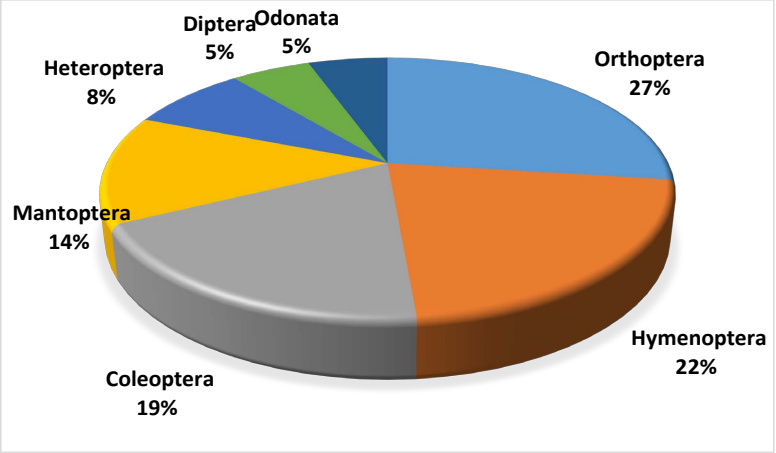

Figure 3. Distribution of the species richness of insects according to the orders.

3.4. Spectrum of Insect Species Richness According to the Families

Proportional representation of different families depending on the species richness (**Figure 4**).

In Yo and Ngatsouéné, family of Mantidae is the most abundant species with 5 (13.51%), followed by Acrididae (4 species; 10.81%), the Apidae, the Coccinellidae and Pyrgomorphidae (3 species; 8.10%), the Calliphoridae, the Formicidae, the Pentatomidae, the Gryllidae, the Libellulidae, the Lycidae and Sphecidae (2 species; 5.40%), finally Coreidae, the Meloidae, the Tetrigidae, the Cerambycidae and the Megachilidae each had one species (2.70%).

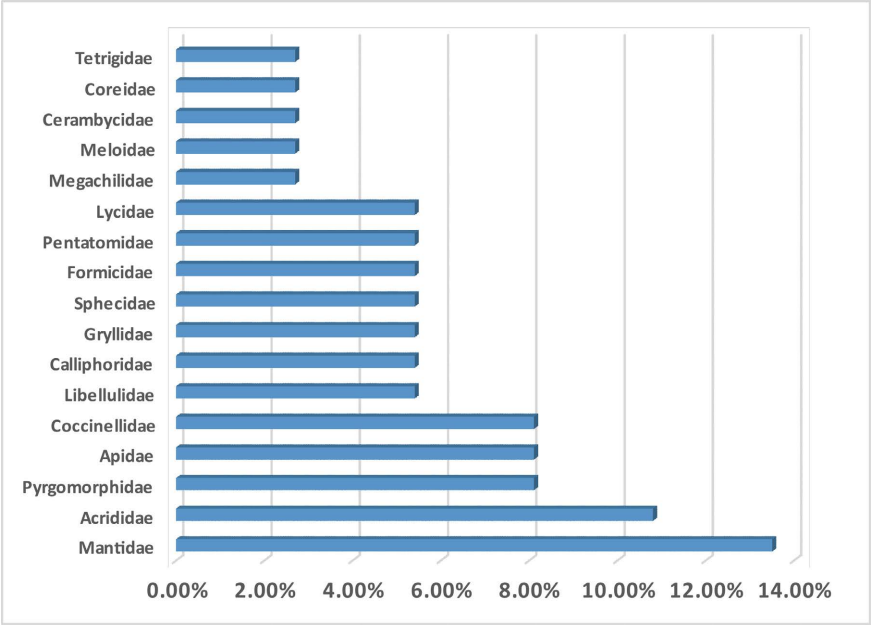

Figure 4. Distribution of the species richness of insects according to families.

4. Conclusion

The study aimed to inventory the aquatic insects of ponds Yo and Ngatsouéné located in Djambala center. The physicochemical analyses of the surface water of these pools show that the water is acidic, and the conductivity values indicate a low water mineralization. The entomofauna census showed a high proportion of the Orthoptera order, and the family of Mantidae has the largest species richness. *Mantis sp* is the most abundant species of these two ponds. This occasional entomological study of ponds Ngatsouéné and Yo constitutes a database which must be enriched by further studies on the aquatic entomofauna of the grove which is the center of the Ngatsouéné.pond. More inventories of other taxa (benthic macroinvertebrates, amphibians) must be made available in these ponds to better understand these ecosystems. It can also deepen this study by working for a longer time to learn about the pond's entomofauna and extend it to all aquatic ecosystems of Djambala and the Department of Plateaux.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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