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# Occurrence and species composition of insect pest associated with some smoked fish species in Bida, Niger State, Nigeria

*Ibrahim, N. J. and Idris, I

[1]Department of Biological Sciences, Federal Polytechnic Bida, Niger State, Nigeria

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**ABSTRACT**

This study elucidated the insect pest species associated with some fish species in Bida, Niger state, Nigeria. Three commonly sold smoked fish species in Bida main market (i.e., *Clarias* spp, *Tilapia* spp and *Synodontis* spp) were obtained. The fish were stored in polythene back for six weeks; thereafter the insect pest infestation was assessed following standard procedure. The total number of insect pests infesting each species of fish, as well as the distribution of the two life stages (larval and adult) of the insects were recorded. *Tribolium* spp, *Dermestes* spp, and *Necrobia* spp were observed infesting the three fish species of fish. The highest insect pest recorded was *Tribulium*, followed by *Dermestes*. The result showed that Tilapia spp was more susceptible to insect pests infestation (57.3%) followed by *Synodontis* spp (24.4%) and then *Clarias* spp (18.3%). *Tribolium* spp was more dominant compare to others insect pest recorded. The adult of all the recorded insect pest was the main life stages infesting on the smoked fish species. Findings from this study suggest need for public awareness and need proper attention to protect fish against insect pest infestation.

**Keywords:** Clarias, Dermestes, Tilapia, infestation, Insect pest

**Corresponding author's email**: juliibrahim2014@gmail.com

## INTRODUCTION

From time immemorial, fish and fish products has been regarded as an important commodity in the international trade with more than 50 billion indicating increasingly consumer interest in the commodity [1]. Currently on a worldwide scale, in the human diet, fish contribute only about 15% of animal protein According to [2], fish constitute about 40% of animal protein intake. Besides, fish and fish products help any growing and

developed nation in term of employment, provision of raw materials for animal industry, income generation, poverty alleviation, and foreign exchange earnings [3]. According to [1,4], dried fish provide an excellent source of protein in the diet of man worldwide. When compared to other sources of protein like eggs, meat and milks in its amino acid constituents, fish protein is characterized with higher level of essential lysine and methionine both of which are lacking in a cereal-based diet. Similarly, fish fat is low in cholesterol with its high content of p provides poly unsaturated fatty acids and its oil is characterized with appreciable high fat-soluble vitamins A and D [5].

The practice of fish preservation through smoking or sun drying is very common in Nigeria. This is attributed to its affordability and also due to the current electricity challenges that causes unavailability of adequate time for ice preservation of fresh fish [6]. In the tropics dried fish are preferable due to their special aroma, flavour and also their oil and moisture contents have been reduced to the minimal [7].

Despite the aforementioned economic value and consumer appreciation of smoked fish, the fish may deteriorate very rapidly due to the infestation by pestiferous insects [7]. According to [1], dried fish contaminated by insect may also pave way for pathogenic microorganisms and these combined constitute about 80 percent of the total dried product that is considered unfit for human consumption [8,11]. The lack of data on the inset pest associated with smoked fish informed this current study. The study shall serve as an eye opener to fish farmers that are yet to adapt the modern technology in fish processing and preservation

## MATERIALS AND METHODS

### Study area

Bida town is traditional emirate and a Local Government Headquarters in Niger state. Its located-on latitude between 6°01'E and 6.017°E of Greenwich Meridian and longitude 9°05'N and 9.08oN of the equator, along A124 highway that linked Ilorin to Minna and Abuja. It has population of 188,181 people based on 2006 National Population Census, and covered a land area of about 51sq km. The major ethnic group found in this city is Nupe, with other tribes from all part of the country. Bida is about 240 kilometres to Abuja (Federal Capital Territory) and situated to the South western part of Minna (state capital). It stretches along Bako River, which is a minor offset of the River Niger on the vertex of roads from Jebba, Zungeru, and Agaie. Bida is a home to Federal institutions like Federal Polytechnic Bida, Edusoko University, Federal Medical Centre and proposed University of Health Technology [9].

### Sample collection

The smoked fish species namely; *Claria* spp, *Tilapia* spp and *Synodontis* spp, used for this study were purchased (fifteen of each species) in Bidda main market, Niger State, Nigeria. The specimens (*Claria* spp, *Tilapia* spp and *Synodontis* spp) were wrapped tightly in polythene bags and transferred to the Biology Laboratory, Federal Polytechnic Bida, Niger state. The identity of the fish species was confirmed by a senior Zoologist. They were thereafter stored in a polythene bag separately for about six (6) weeks for further examination [5].

### Assessing the Fish species for Insect Pest Infestation

After six weeks of storage and in order to exposed the various insect pests, the stored smoked fish were placed on a different shallow tray, each for a particular species, and there after spread. Hand lens was used to view each of the species in order and entomological forceps was used to extract any observable insect pests. Both the larval stage and adult were preserved in a labeled specimen bottles with 70% alcohol prior to identification.

### Counting and identification of insect pests

The adults and larvae of insects collected from the different species of smoked fish were identified to possible taxonomic level in the laboratory. The identification was based on the morphological features of the insects; microscope was also employed for the proper view in order to clearly identify their features. The different species of insect pests found were counted and recorded. The adult and larval forms were counted separately for each species of the insect pests on the smoked fish and recorded.

### Data analysis

Simple percentage was used to analyze the total number of insect pests collected from each of the three species of fish used for the research. Data was processed using Microsoft excel, 2019$^{th}$ version.

## RESULTS

The result of the insect pest species infesting some smoked fish in the study area is presented in the Table 1. On the general note, there were three main categories of insect species associated with smoked fish, these includes *Dermestis, Necrobia* and *Tribolium* spp, respectively. Tilapia species recorded the highest (50.85 %) insect infestation followed by *Synodontis* (26.27 %) while the least insect infested fish was *Clarias* spp (22.85 %). The occurrence of the insect pest species varies among the fishes examined. While in *Clarias, Tribolium* spp recorded highest infestation (77.78%) *Necrobia* was recorded highest (70.97%) in *Synodontis* spp. Also, the insect pest that showed highest infestation on the fish was *Tribolium* spp.

The result of the adult and larva occurrence and abundance in relation to the fish species they are associated with is presented in Table 2. The adult stage of the insect pest was found to be the most encountered with the smoked fish examined. On the other hand, the *Necrobium* larva was highest abundance of insect larvae recorded. The population of *Tribolium* was highest in the Tilapia spp followed by *Clarais* spp, while the least were observed in *Synodontis* spp.

**Table 1: Infestation status and insect pest species associated with smoked fishes in Bida**

| Fish species | *Tribolium* spp (%) | *Dermestes* spp (%) | *Necrobia* spp (%) | Total insect (%) |
|---|---|---|---|---|
| *Clarias* spp | 21(77.78) * | 4 (14.81) | 2 (7.41) | 27 (22.88) |
| *Gynodontis* spp | 3 (9.68) | 6 (19.35) | 22 (70.97) | 31(26.88) |
| *Tilapia* spp | 34 (56.67) | 7 (11.67) | 19 (31.67) | 60 (50.85) |

*Values in porentesis represent the percentage occurrence of the insect species

**Table 2: Occurrence and abundance of adult and larva states of insect pest association with some smoked fish species**

| Fish species | *Tribolium* spp | | *Dermestes* spp | | Necrobia spp | |
|---|---|---|---|---|---|---|
| | Adult | Larva | Adult | Larva | Adult | Larva |
| *Clarias* spp | 20 | 1 | 4 | 0 | 1 | 1 |
| *Synodontis* spp | 3 | 0 | 3 | 3 | 14 | 8 |
| *Tilapia* spp | 34 | 0 | 7 | 0 | 11 | 8 |

## Discussion

Insect infestation on food items has been well addressing as one of the limiting factors affecting food security. Despite the immeasurable health, social and economic benefit of fish and fish product, the fauna still suffers severe losses due to pest and pathogen infestation. [1] mentioned that insect infestation is mostly with dried fish.

In the current study, the most infested by the insect pest, among the examined fish species was Tilapia. There is possibility that the smoked Tilapia fish contained more suitable for the insect pest to drop their egg and/or larva compared to other fish spp examined. It is possible that the variation in the abundance of insect pest is due to the differences in their storage time. This is very possible since the smoked fish were purchased from sellers. In most time fish sellers buy in bulk and can only restock after selling the old stock. The increase in storage period could be the

contributing factor that affords the insect pest enough time to breed and multiply in the fish host body [2]. This observation is in conformity with the report of [7].

The above observation was confirmed with abundance adult stage of the insect pest compare to the larval stage. By implication, the adult stage of insect pest implication will result into higher economic loss because they infest in high abundance and feed on the tissue of the fish [1,10,12].

## CONCLUSION

The study recorded three species of insect pest associated with smoked fish in Bida metropolis. Tilapia was the fish spp that is mostly susceptible to insect pest infestation in the study area. The adult stage of the insect pest caused most of the damage. There is therefore need for more attention and concentration on preventing insect pest infestation of fish during processing and preservation.

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