



## INVESTIGATION OF INSECT PESTS ON THREE SPECIES OF SMOKED FISH IN MUBI NORTH-EASTERN NIGERIA

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### ABSTRACT

The research was carried out in Mubi, North Eastern Nigeria to investigate the insect pest species infesting three different species of fish, viz: *Clarias* spp, *Tilapia* spp and *Synodontis* spp. *Dermestes* spp, *Necrobia* spp and *Tribolium* spp were the common insect pests found infesting the three species of fish. Data collected on 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 was analyzed using simple percentage. The result showed that *Tilapia* spp was more prone to infestation by insect pests (57.3%) followed by *Synodontis* spp (24.4%) and then *Clarias* spp (18.3%) in the following order: *Tilapia*>*Synodontis*>*Clarias*. *Tribolium* spp was the dominant insect pest, with about 61.7% infestation on *Tilapia* spp, and 100% on *Clarias* spp, followed by *Necrobia* spp with 31% infestation on *Tilapia* spp and 80% on *Synodontis* spp. The distribution of adult and larval stages of the insect pests was also noted, and the result showed that the bulk of insects infesting the three species of smoked fish in Mubi, Nigeria, are in the adult stage.

**KEY WORDS:** *Clarias*, *Dermestes*, *Necrobia*, *Synodontis*, *Tilapia*.

### INTRODUCTION

Fish constitute about 40% of animal protein intake Eyo, (2001). Fish is a low acid food that supports the growth of pathogen, therefore careful handling and rapid processing are essential. It has been reported that 10% weight loss by the fish is as a result of poor handling, processing, storage and distribution (Akande *et al.*, 1998; Madison *et al.*, 1998). The longer the processor leaves the fish in condition favorable to spoilage the greater the destruction. Most fish are susceptible to damage by insects such as blowfly larvae as they are voracious feeders (Madison *et al.*, 1998; Procter, 1972). A number of insects infest processed fish but the most important fall into two groups the blowflies and beetles. Insect flies and beetles destroy vast amount of fish in developing countries while it is being processed or stored (Johnson and Esser 2000). Insect infestation of cured fish by blowflies and hide beetles is an important cause of post harvest fish losses in many developing countries like Nigeria. Fish are susceptible to attack by insect pests throughout processing and storage. The commonest method of post harvest fish preservation is smoking Reed, (1997). Smoking provides very little control against insect's attack (Okorie, 2003). Under prevailing conditions, it is estimated that between 25% and 75% of the nutritional value of fish is lost during attack by insect pests, (Johnson and Esser, 2000). These insect pests invade the fish at different stages of processing and storage thereby destroying it (Johnson and Esser, 2000).

Losses caused by insect infestation are enormous. They include physical loss where by the fish available for human consumption is reduced, economical loss where by the physical loss depletes the amount of fish available for sale, and nutritional loss which is the direct consequences of the physical and economic loss and cause the retail value of fish to increase beyond the purchasing power of the poor (Moses, 1992).

Fish is a major source of food in West Africa even beyond. In view of its importance as a source of food therefore, the demand for fish has been on the increase. Fish farming in commercial quantities has been gradually appreciating in the recent past in Nigeria. In the quest for meeting the needs of fish consumers across the West African sub-region, fish farmers and or sellers began to develop various means of storing the fish in order to preserve it for a longer period and moreover, to package it and getting across other places where it is lacking. The major challenge face by fish farmers is that fish are perishable and easily infested by insect pests. It is in the light of this that most fish farmers developed the smoking method of fish preservation.

Therefore, this study intends to determine those insect pests that easily attack smoked fish during preservation, and to also determine the dominant pest infesting different species of smoked fish in Mubi, North-Eastern Nigeria. 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

The study area is Mubi, a town which comprises of Mubi North and Mubi South local Government areas of Adamawa State. Mubi is located in the North Eastern region of Nigeria between latitude 10° 14' N and 10° 18' N of the equator and longitude 13° 14' E and 13° 19' E of the Greenwich Meridian. It occupies a land of about 725.85 km<sup>2</sup> with an estimated population of about 300,000 people. The area has tropical climate with an average temperature of 32°C and lies within the Sudan Savannah vegetation zone of Nigeria. The area has an average relative humidity from 28% - 45% and annual rainfall of about 1056 mm (Adebayo and Tukur, 1999).

### Collection of materials

The materials required for this research were obtained as follows:

*Claria* spp, *Tilapia* spp and *Synodontis* spp were purchased (twenty of each species) in Mubi main market in Adamawa State, Nigeria.

The specimens (*Claria* spp, *Tilapia* spp and *Synodontis* spp) were wrapped tightly in polythene bags and were conveyed to the Entomology/Parasitology Laboratory, Department of Biological Sciences, Adamawa State University Mubi. The specimens were subsequently identified in the Department of fisheries, Adamawa State University, Mubi. These were stored in a polythene bag separately for about six (6) weeks for further examination.

### Screening of insect pests from different species of smoked fish

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

### 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.

## RESULTS

Three categories of insects were identified. Viz: *Dermestes* species (Dermestidae), *Necrobia* species (Cleridae) and *Tribolium* species (Tenebrionidae) on the three species of fish used for the research.

Table I shows the infestation of different insects found in the species of smoked fish. Of the total number of insect pests collected, *Tilapia* spp constitutes about 57.3%, *Synodontis* spp 24.4% and *Clarias* spp 18.3%. In *Tilapia* spp, *Dermestes* species constitutes 06.4% of infestation, *Necrobia* spp 31.9% and *Tribolium* spp 61.7%. In *Synodontis* spp, *Dermestes* spp constitutes 20.0% infestation, *Necrobia* spp 80.0% and *Tribolium* spp has 0.0%. *Clarias* spp was less infested among the three species of fish, with 0.0% of its infestation by *Dermestes* spp, 0.0% by *Necrobia* spp and 100.0% by *Tribolium* spp.

**TABLE I:** Percentage infestation of different insects found in the species of smoked fish

Species of fish	Total number of insects	<i>Dermestes</i> spp	<i>Necrobia</i> spp	<i>Tribolium</i> spp
<i>Tilapia</i> spp	47 (57.3%)	3 (6.4%)	15 (31.9%)	29(61.7%)
<i>Synodontis</i> spp	20 (24.4%)	4 (20.0%)	16 (80.0%)	0 (0.0%)
<i>Clarias</i> spp	15 (18.3%)	0 (0.0%)	0 (0.0%)	15 (100.0%)

The distribution of adult and larval stages of the insect pests observed in the different species of smoked fish is shown in Table II. The populations of *Necrobia* spp larvae were recorded highest in the *Tilapia* spp followed by *Synodontis* spp while *Clarias* spp recorded zero.

**TABLE II:** Occurrence of Adult and Larval stages of insects in the different species of smoked fish

Species of fish	<i>Dermestes</i> spp		<i>Necrobia</i> spp		<i>Tribolium</i> spp	
	Adult	Larva	Adult	Larva	Adult	Larva
<i>Tilapia</i> spp	3	0	9	6	21	8
<i>Synodontis</i> spp	3	1	12	4	0	0
<i>Clarias</i> spp	0	0	0	0	12	3

## DISCUSSION

The results of the study show that smoked fish of *Tilapia* spp was the most prone to infestation by insect pests followed by *Synodontis* spp while *Clarias* was least infested in this order: *Tilapia* spp> *Synodontis* spp>*Clarias*. The results also showed that *Tribolium* spp is the major pest infesting the different types of smoked fish used for this study (*Tilapia* spp, *Synodontis* spp and *Clarias*) followed by *Necrobia* spp in this order: *Tribolium* spp>*Necrobia* spp>*Dermestes* spp (Table I). This shows that *Tribolium* spp was clearly the most occurring insect pest infesting the three different species of smoked fish in Mubi, Nigeria.

In *Tilapia* spp, insects of *Tribolium* spp constitute 61.7% of the infestation and *Necrobia* spp 31.9%. This observation therefore does not agree with the investigation carried out by Osuji, (1973). Indicating that insects preferred *Clarias* fish to all other available species of dried fish. *Clarias* spp although less infested than *Tilapia* spp has 100% infestation by *Tribolium* spp and 80.0% by *Necrobia* spp while *Tilapia* spp had 61.7% of its infestation by *Tribolium* spp and 31.9% by *Necrobia* spp. The level of infestation of the smoked fish by *Tribolium* spp may be directly related to the

length of storage of the fish as the fish sellers purchase smoked fish in bulk and do not buy more until the old stock is finished. This observation therefore agrees with the report by Eyo, (2001), who reported that long storage periods allow the insects more time to breed and consume the fish, thus leading to ever increasing infestation.

The occurrence of adult and larval stages of the different species of insect pests found in the smoked fish showed that the bulk of insects that infest the smoked fish were in the adult stage (Table II). This means that the adult stage cause most of the damage because they infest smoked fish in very large number and feed on the tissue of the fish.

## CONCLUSION

The study reveals that insect pests significantly infest smoked fish, leading to post harvest loss, which may include physical loss, economical, and nutritional loss. The research also revealed that *Tribolium* spp is the major pest infesting smoked fish in Mubi, Nigeria; and that adult stage of the insect does most of the damage.

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