



Arthropod pest infestation of dried fish sold in Gashua market, Yobe state, Northeast Nigeria

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Abstract

An entomological survey to investigate the arthropod pest's infestation of dried fish sold at Gashua Market, Yobe State, Nigeria was carried out between May, 2023 and August, 2023. Dried fish samples of different species dried sold in Gashua market, were purchased from different fish sellers; the fish sample was sealed in a polythene, numbered serially. The fish were identified by an ichthyologist in the Biological Sciences Laboratory, Federal University Gashua. Each of the dried fish samples was exposed on an illuminated surface where they were visually examined with the magnified lens. The set-up was examined and arthropods caught were collected in a transparent collection bottle and identified key atlas obtained from the Nigeria Institute of Freshwater Fishes (NIFF). The survey of dried fish showed that (5) genera of smoked and dried fish were sold in the market (*Hemichromis*, *Bagrus*, *Clarias*, *Labeo* and *Alestes*). In arthropod pest of dried fish *Aletes* nurse has the highest percentage of 25.6% and *Labeo senegalensis* has the lowest percentage. The arthropod pest of derided fish, *Bagrus bayad* has the highest percentage 34.2%, of arthropods pest infestation *Hemichromis bimaculatus* has the moderate percentage of 29.9% and *Clarias gariepinus* constitute the lowest percent of 4.3 respectively.

Keywords: Arthropod, Dried fish, Gashua, Nigeria

Introduction

Dried fish is consumed as special delicacy in many parts of the world. Fish is one of the cheapest sources of animal protein in Africa. Small-scale fisheries play an important role in fish production especially in West Africa. It supplies a large number of people with affordable high quality animal protein. The most common method of preserving this fish for optimum supply by drying or smoking. Dried fish form a traditional part of the diet for a large protein of the world population. (Ayuba and Omeji, 2006; Okonta and Ekelemu, 2005). Fish, in addition to its nutritional value, is a major source of employment and trade for millions of people living close to water via harvesting, handling, processing and distribution (Bene and Heck, 2005; Al-Jufaili and Opara, 2006; Mufutau, 2012).

Fish, however is highly susceptible to deterioration especially if not well preserved (Okonta and Ekelemu, 2005). It is a perishable food material; its flavour and texture changes rapidly during storage after death. The dried and smoked fish is commonly sold in the market both at urban and rural settlements in Nigeria. Fish consumption is not forbidden within religious groups unlike eating pork (Agbelege and Ipinjolu, 2001). As a result, fish has been consumed by large proportion of the population and has become a staple diet. With the rising cost of meat and cheese protein foods, consumers have become increasingly interested in fish as a source of dietary protein (Okonta and Ekelemu, 2005). Smoked dried fish suffer considerable weight loss as a result of damages caused by insects' pests and mites. FAO (1989) reported that in adverse condition, up to 30% of smoked and dried or stored fish is lost due to flies infestation during the period of

processing and up to 50% as a result of beetle damage. Infestation of smoked and dried fish by insect pests could also pose public health hazards as some of them are diseases vectors promoting growth of pathogens to man and other creatures. It has been reported that different taxonomic families of fish is found in Gashua Yobe State, especially Characidae, Cyprinidae, Mochokidae, Schilbedae, Claroteidae, Cichlidae, Polypteridae, Tetraodontidae, Gymnarchidae, Citharinidae and Centropomidae (Araoye, 2008; Mustapha, 2010; Omotosho, 1998). The family Cichlidae has been identified as the most dominant in terms of species diversity and number, as a result of food presence and its prolific breeding capabilities (Araoye, 2008; Omotosho, 1998). It worthies of note that different preservation methods such as drying, smoking, freezing and heat treatment were applied to extend the shelf-life of the product (Ikenweuwe, and Bolaji, 2010; Babarinde, and Adebayo *et al.*, 2016).

Despite the efforts made to preserve catches, pest infestation are common in most developing countries, including Nigeria. Arthropod pests that are commonly found on dried fish in Nigeria are beetles (Coleoptera), flies (Diptera) and mites (Acarina) (FAO, 1989) and genera like *Calliphora*, *Chrysomia*, *Lucillia*, *Musca* (Diptera), *Dermestes* and *Necrobia* (Coleoptera) (Osuji, 1985, Mufutau, 2012; Babarinde *et al.*, 2012, Adebayo *et al.*, 2016, Babarinde, Sunnie-Ododo *et al.*, 2016). Beetles of the family Dermestidae invade fish from the earliest stages of drying and breed in the dried product (Abolagba, *et al.*, 2015) and are also associated with spread of anthrax and contaminants of insect origin in the foodstuffs of

some countries, resulting in market value reduction for fish vendors (Osuji, 1985). (Osuji, 1973; Ayuba and Omeji, 2006). The growth and development of dried fish pests are promoted by poor traditional processing methods, storage and packaging. Arthropod pests, including insects and mites can infest dried fish during storage and transportation, leading to quality deterioration, economic losses, and potential health risks for consumers. There is paucity of information on the comprehensive knowledge regarding the species of arthropod pests and their infestation levels on dried fish sold at Gashua Market Yobe State. Arthropod pests can cause the spoilage of dried fish by feeding on the product and leaving behind their waste, which can contaminate the fish and reduce its quality. Some arthropod pests are known to carry harmful pathogens that can cause diseases such as food poisoning, which can be transmitted to humans who consume contaminated dried fish. Arthropod pests can also cause aesthetic problems by creating an unappealing appearance on the surface of the dried fish, which can deter potential buyers and affect the overall marketability of the product.

Materials and methods

Study area

The study was carried out in the department of Biology Federal University Gashua, Yobe State Nigeria. Gashua located on 12° 52' 26.33 "N, longitude 11° 02' 26.05" E. Gashua is a community in Yobe State in Northeastern Nigeria, on the Yobe River a few miles below the convergence of the Hadejia River and the Jama' are River basin. Average elevation is about 299 m. The town lies near the Nguru-Gashua Wetlands, an economically and ecologically important ecological system (Neiland, 2010). The population was approximately about 125,000 (National population commission, 2006). The temperature ranges between 38 and 40°C. In rainy season, June-September, temperatures fall to 28°C, with rainfall of 500 to 1000mm/annum. Gashua is one of the largest and most developed towns in Yobe State. Since 1976 it has been headquarters of the Bade Local Government Area. Bade language is spoken in Gashua and in an area fanning out East and South of Gashua. Bade is one of seven languages of the Chadic family indigenous of Yobe State (Neiland, 2010).



Fig 1: Showing the map of Gashua, Bade LGA, Yobe State

Collection and identification of sample

100 samples of different species of dried fish sold in Gashua market, were purchased from different fish sellers; the fish sample was sealed in a polythene container and numbered serially (Olaosebikan and Raji, 1998).

The fish samples were later identified and analyzed in the Biological Science Laboratory, Federal University Gashua. Each of the dried fish samples was exposed on an illuminated surface where they were examined with the aid of a magnifying len (Osuji, 1985; FAO, 1989). The arthropods that wriggled out of the dried fishes were collected in separate transparent bottles and analyzed in the laboratory. Also, the

dried fish samples were cracked to make sure that no arthropod pest infesting the fish was left out (Osuji *et al.*, 1985).

Examination of sample

The arthropods caught were collected in transparent bottles, identified and analyzed in the laboratory (FAO, 1989). The data obtained from the study were analyzed using descriptive statistics such as frequency, percentage, and mean. The prevalence of arthropod pests was calculated as the proportion of fish samples that were infested with arthropod pests. The mean weight and length of fish samples were also calculated.

Results

Arthropod pest infestation of dried and smoked fish in relation to species

Table 1: Arthropod pest of dried fish in relation to species

Fish	Specific name of pest	Common name	Number of collection	Percentage (%)
<i>Labeo senegalensis</i>	<i>Dermestes maculatus</i>	beetles	30	5.9
<i>Aletes nurse</i>	<i>Dermestes maculatus</i>	beetles	7	25.6
Total			37	31.5

Table 2: Arthropod pest of dried fish in relation to species

Fish	Specific name of pest	Common name	Number of collection	Percentage (%)
<i>Clarias gariepinus</i>	<i>Brassicogethes aeneus</i>	Pollen beetles	5	4.3
<i>Bagrus bayad</i>	<i>D. maculatus</i>	Beetles	40	34.2
<i>Hemichromis</i>	<i>D. maculatus</i>	Beetles`	35	29.9
Total			80	68.4

Discussion

This study has shown that (5) genera of dried fish were sold in the Gashua market Yobe State and these are *Hemichromis*, *Bagrus*, *Clarias*, *Labeo* and *Alestes*. It was observed that dried fish were infested by different species of arthropod pest and this corroborate with the findings of Osuji (1974) and Busvine (1980) respectively. In Dugbe market 71.5% of the observed infestation was *D. maculatus*, while *N. rufipes* was next in importance accounting for 28.0% (Osuji, 1974). It was observed in this study that 34.2% of the collected arthropods

pest from dried fish in Gashua market Yobe State were *D. maulatus maulatus*, *T. molitor* 25.6%. In addition to *D. maulatus*, mites were also encountered to have infested dried fish in Gashua market Yobe State Apart from infestation of dried fish, *D. maulatus* has been reported as pest of carcasses, meat, hides and skin and other dead animal (Busvine, 1980; Nayer *et al.*, 1992). This study has revealed the infestation of the dried fish by *Alestes* sp. with *D. maulatus* and *Brassicogethes aeneus* the research revealed that *Labeo* sp was least infested with *D. maulatus*.

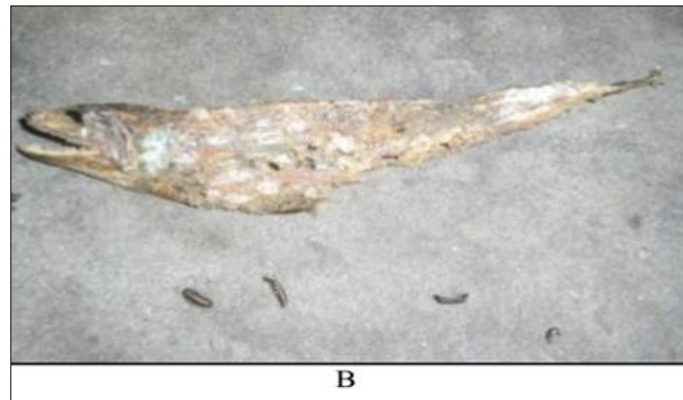
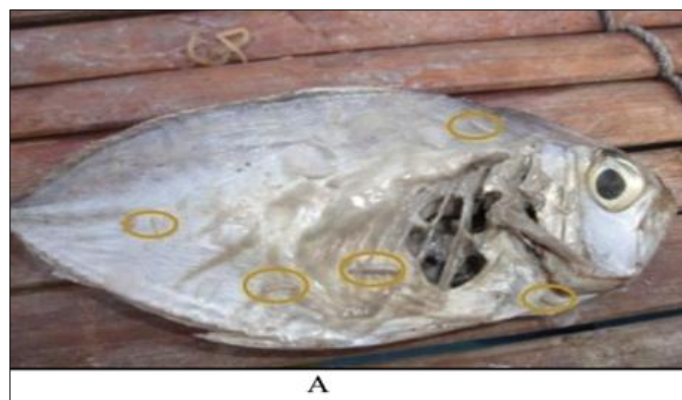


Fig 1: Infestation of mite on dried fish



Fig. 2: Larval stage (Beetles)



Fig 3: Adult stage (Beetles)

Conclusion and recommendations

The study revealed that arthropod pests has significantly infested dried fish, sold in Gashua Yobe State, thereby leading to post harvest losses, which may include physical, economical, and nutritional losses. It has been observed that *D. maulatus* is the major arthropod pest that infested the dried fish sold in Gashua market and that adult stage of the arthropods does most of the damage. Appropriate control measures should be employed during the harvesting, transportation, handling, processing and packaging of dried fish because of their infestation by arthropods, the fish sellers should collaborate with Government agencies to ensure provision of good preserving facilities in the market. Propose improved storage and handling practices to minimize the risk of infestation. Also appropriate packaging materials or techniques to protect the fish product should be adopted. Quality control measures should be implemented to ensure the safety and quality of fish products. Finally, awareness campaigns programs to educate fish processors and consumers about the important of pest control should be established respectively.

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