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GRASSHOPPERS (*Zonocerus variegatus*) AS A POTENTIAL GLOBAL ALTERNATIVE SOURCE OF PROTEIN

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ABSTRACT

The grasshopper (*Zonocerus variegatus*) has been consumed for centuries in Africa, Asia and some other parts of the world. It has a superior nutritional content compared to other animal protein but has received little attention globally for various reasons. As the world strives to overcome global hunger and malnutrition, especially in underdeveloped and developing countries, this insect shows tremendous potential as an alternative rich protein source with its resilience and abundance in nature. More scientific research is needed to explore the potential of this insect to help alleviate the food needs of the world's current 7 billion people.

KEYWORDS: *Zonocerus variegatus*, microlivestock, protein, grasshopper

INTRODUCTION

Entomologists have described edible insects as "microlivestock" (Lyon, 1991). Although entomophagy (the human consumption of insects) has not received significant attention in western Literatures, inspite of the superior nutritional content of edible insects compared to other animals (Lyon, 1991; Iligner and Nel, 2000) this has been attributed to nothing more than customs and prejudice (Owen, 1973). This organism is highly abundant in nature and varies in abundance depending on the type of vegetation cover in a region with forests with *Chromolaena odorata* much more favoured (Kekeunou *et al.*, 2007). It is the dominant species among grasshoppers in many farmlands in Nigeria and elsewhere (Oku *et al.*, 2011). Too much attention has been focused on the destruction of this potential alternative food source rather than on its preservation and growth (Müller, De Groote, Gbongboui, and Langewald, 2002; Ogunlabi and Agboola, 2007). There is a long history of insects' consumption in Africa and Asia (Sutton, 1988; Mian, 2003; Agbidye *et al.*, 2009) and we will use Nigeria as a case study. Several studies in Nigeria have shown that the practice of entomophagy has contributed significantly to the reduction of protein deficiencies in the country (Ene, 1963; Ashiru, 1988; Fasoranti and Ajiboye, 1993; Banjo *et al* 2006; Omotosho, 2006). A number of insects or their products were used as food in many parts of Nigeria (Ene, 1963).

The potentials of *Zonocerus variegatus*

Insects are widespread on earth (Demirel and Cranshaw, 2006) and adapt to all manner of climate, weather and altitude conditions (Idris *et al.*, 2002; Riedel *et al.*, 2008). The most widely consumed insect species are grasshoppers (Burnie, 2007). Many modern entomophagers contend that insects should be the food of the future because they are nutritionally superior to many other meat protein sources, such as beef and chicken. In addition, insects are abundant; they constitute about 75% of known species of animals (Yoloye, 1988). With about 1500 identified edible species (Dufour, 1987; Smith, 1999), some insects are eaten as larvae, others in their adult stage (Wikipedia, 2010). In deserts or sub-Saharan environments and developing countries where food and water is scarce, and malnutrition has been reported to be very high (Joosten and Hulst, 2011; Norman, Pichard, Lochs, and Pirlich, 2008; Saunders, Smith, & Stroud, 2011) these insects can be an important food stable source (Kho, 2002). The northeast region of Nigeria is the second largest livestock producer in Nigeria (Majiyagbe and Lamorde, 1997), but very little has been done or documented about the rich "microlivestock" population of this region and the high cost of animal protein, which is beyond the reach of the highly impoverished population has reawakened and encouraged entomophagy in this part of the country more than other parts. This renewed interest in entomophagy will also help to reduce the pest role of *Zonocerus variegatus* which requires attracticides (Timbilla *et al.*, 2007) to control in Africa and many parts of the world.

Nutritional and other uses

In terms of nutritional content and simple cost-effectiveness, insects are far easier to raise as well as being economically and environmentally friendly (Kho, 2002) require less space and harvesting the insects for food

and feeds could reduce the need for chemical controls (Smith, 1999) which is being discouraged because of their harmful effects on the environment (Arendsen *et al*, 1989; Abou-thiam, 1991). Insects, especially grasshoppers and locusts affects man either as pests, destroying man's valuable materials and crops (Adewale and Afolayan, 2006; Müller, *et al.*, 2002; Ogunlabi and Agboola, 2007) or as a source of his nutrients (Lyon, 1991; Iduwu and Modder, 1996; Banjo *et al* 2006). Goodman, (1989) has proposed other possible uses of these creatures. Whole dried insects are about 10 percent chitin, an unbranched poly-B-(14) linked N-acetyl-D-glucosamine, whose derivatives, particularly chitosan, possess properties that are of interest in medicine, industry and agriculture. Some of the uses include; for reducing serum cholesterol, haemostatic agent for tissue repair, enhancing wound and burn healing, nonallergenic drug carrier, for enhancement of textile washing, high tensile strength biodegradable plastics, boosts yield of crops and as soil nematocides and fungicides (Goodman, 1989).

The grasshopper (*Zonocerus variegatus*) is a seasonal pest (Kekeunou *et al.*, 2006) which has a large population during dry season in northeastern Nigeria and have been reported eaten in other parts of the country (Fasoranti and Ajiboye, 1993; Iduwu and Modder, 1996). It is also a pest and vector of disease in rice in different countries in Africa and around the world (Nwilene *et al.*, 2009). Various insecticides are used to control insect pests on farms with varying economic impacts and gains (Iya and Kwaghe, 2007). Although very few literature record the consumption in northeast, Nigeria the inhabitants of these region have been eating insects for centuries. It is also called the desert shrimb (<http://www.uglyfood.com>). Young children delight in catching the grasshoppers, but unlike the native American tribes, non-firing methods which includes picking the grasshoppers from the grass and bushes late in the night or early in the morning before they become active (Downs, 1966) is commonly employed. They are dewinged, seasoned with salt and fried to make a very tasty snack.

Microbiological analysis

Spoilage is an undesirable change in the natural or original product and may be caused or induced by microorganisms, among other factors (Hul, 1991). Microbiological analysis of some edible insects in Nigeria showed that the presence of toxigenic and pathogenic bacteria and fungi are mostly due to exposure and unhygienic processing conditions (Braide *et al.*, 2006). If spoilage is to be controlled and pathogens eliminated, there must be an understanding and knowledge of the microbial ecology of the normal flora and spoilage microorganisms of grasshopper.

CONCLUSION

While the food value of insects has been known to country people for centuries, it is only in recent years that scientists have begun to study the nutritional content of insects and its possible use as food and animal feeds (Luo, 1989) with the human population increasing exponentially every year, demographers have been issuing regular warnings about the possibility of widespread famine in the new millennium. However, it has been proposed that a ten percent (10%) increase in the world supply of animal proteins through mass production of insects can largely eliminate the malnutrition problem and also decrease the pressure on other protein sources (Robert, 1989), hence, it seems logical therefore to explore all potential sources of food even if the idea of eating insect might be distasteful to some.

Conflict of interest

None of the authors of this paper has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of this paper.

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