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REVIEW ARTICLE

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Gut Parasites of Field Crickets (*Brachytrupes membranaceous*) in the Eastern Zone of Kogi State, North-Central, Nigeria

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ABSTRACT

Insects have played major roles, especially in the history of human nutrition and are considered as an alternative in effort to increase global food security. Field Crickets (*Brachytrupes membranaceous* Drury, 1773), is one of the most important edible insects consumed by people all over the world, as a source of animal protein. A study was carried out at the Eastern Zone of Kogi State, North-Central, Nigeria, between July, 2016 and September, 2016, to identify different species of parasites harboured by the field crickets in the area. 165 field crickets were collected at nine locations by digging them out from their burrows.

*The midgut region of alimentary canal was dissociated and transferred into test tubes, and then homogenized in sterile glass homogenizer and centrifuged, and examined on the microscope. The prevalence of different types of endoparasites encountered were 17 (10.3%) *Spiniochordodes sp.*, and 59 (35.8%) *Paragordius sp.* The Month of August recorded the highest rate, while September recorded the lowest prevalence rate respectively. The direct harmful effects could result from the consumption of raw or improperly prepared field crickets, since they have been incriminated as the reservoir hosts of these helminthes parasites. Therefore, adequate preventive measures should be adopted by the people who consumed them.*

Keywords: Gut, Parasites, Crickets, Eastern, Kogi and Nigeria.

INTRODUCTION

The roles played by edible insects in the nutrition, art, customs and beliefs of indigenous communities cannot be overemphasized (Dunkel, 1998; Adedire, 2011; Paiko *et al.*, 2013). Insects have played major roles, especially in the history of human nutrition and are considered as an alternative in effort to increase food security in Africa, Asia, North and Central America and Latin America (Bodenheimer, 1951; Kruse and Kwon, 2004; FAO, 2012, 2015). Field Crickets (*Brachytrupes membranaceous* Drury, 1773), known in Hausa as “Gyare”, in Igala as “Olule”, ‘Ententen” in Igbo, in Yoruba as “Ire”, in Idoma “Ata”, and in Tiv as “Ngwaja”, etc, is one of the most important edible insects consumed by people all over the world, as a source of animal protein (Paiko *et al.*, 2013; Usman, 2014).). Field crickets are an integral part of the diet in many regions according to seasonal availability and they are consumed as a delicacy (Paiko *et al.*, 2013). Field Crickets remains one of the commonest edible insects consumed by the people of the Eastern Zone of Kogi State, Nigeria (i.e. Igala ethnic nationalities). Therefore, people in the Eastern Zone of Kogi State remains one of the susceptible ethnic group that might be liable to infection by parasites that could be harboured by crickets. This study therefore, attempts to establish the prevalence of endoparasitic fauna amongst te Field Crickets and their implications on human health in the Eastern Zone of Kogi State, North-Central, Nigeria.

MATERIALS AND METHODS

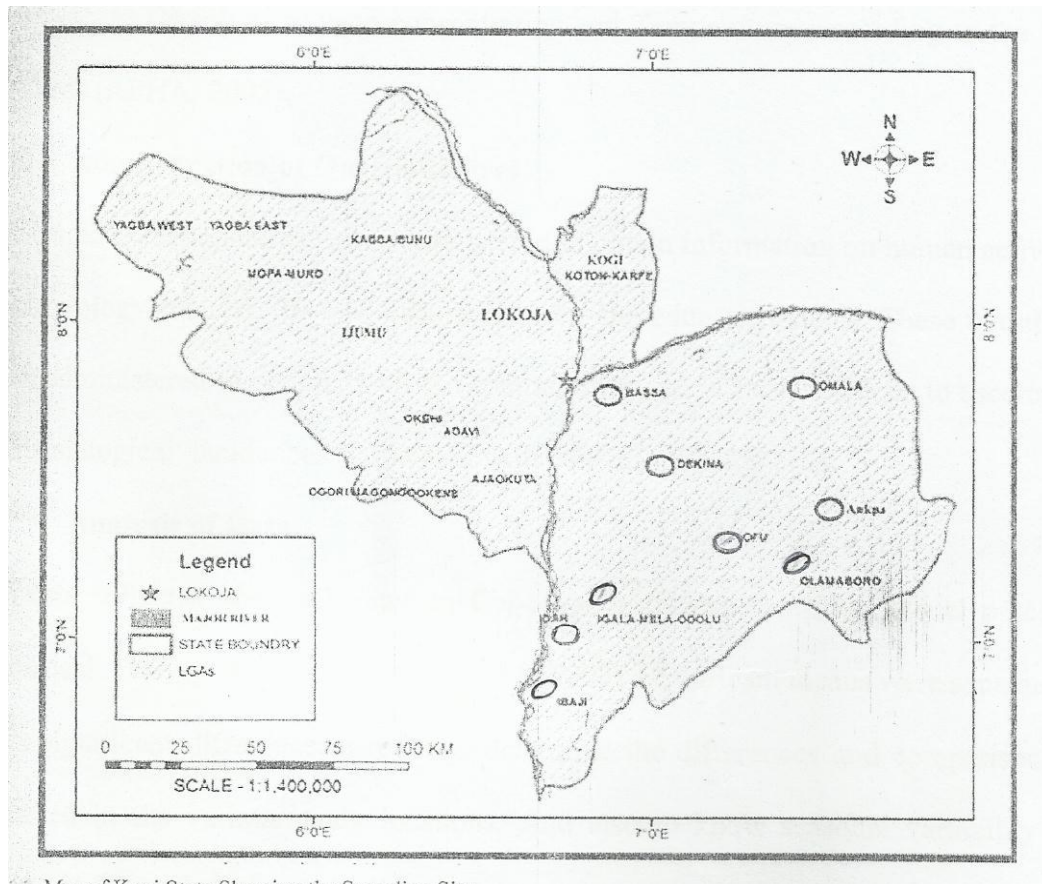
Study Area

The study was carried out at the Eastern Zone of Kogi State, North- Central, Nigeria, between July, 2016 and September, 2016. The area is approximately between latitudes 6° 30' and 8° 40' North and longitude 6° 30' and 7° 40' East and covers an area of about 13,665 sq. km² The Eastern Zone (Igalaland) has an unusual and richly endowed environment which consist of fertile arable land for farming and fresh water bodies for fishing, which lies within the “middle – belt” of Nigeria. The zone is characterised by a tropical climate with two distinct seasons; a rainy season (March and October) and a dry season (November to March). The minimum temperature recorded was 13.8⁰C in January and Maximum of 31⁰C in March. The area has an average rainfall of about 50^{ll} a year (KGSMOI, 2015).

Collection and Examination of Samples

A total of 165 field crickets (*Brachytrupes membranaceous*) were collected at nine locations by digging them out from their burrows. The crickets were conveyed from the sampling sites in a

transparent plastic bucket (Ogedengbe and Rotimi, 2004), to the Parasitology Laboratory Section of the Department of Biological Sciences, Kogi State University and were dissected in petriplates. The midgut region of alimentary canal was dissociated and transferred into test tubes, and then homogenized in sterile glass homogenizer and centrifuged (Gouli *et al.*, 2011). The parasites were identified with the aid of pictorial key's diagnostic features modified by Chitwood (1959; Hanelt, *et al.*, 2005; Jochmann and Schimdt-Rhaesa, 2007; Gouli *et al.*, 2011).



RESULTS

Out of 165 Field Crickets examined for parasites, 76(46.1%) had different types of parasites (Table 1). The prevalence rate of different types of parasites encountered were 17 (10.3%) *Spinochordodes* sp., and 59 (35.8%) *Paragordius* sp. The difference in the two species of parasites of Field Crickets was statistically significant ($p > 0.05$) but considering the prevalence rate *Paragordius* sp is higher than *Spinochordodes* sp (Table 2). The prevalence of parasites among the sexes, indicated that out of the 165 field crickets examined, only male had heavy infection, with prevalence of 31.5% and female had 14.6% (Table 3). The prevalence of parasitic infestation in the months were 25(15.2%) July, 28(17.0%) August and 23(13.9%) September, 2016 (Table 4). The Month of August recorded the highest rate, while September recorded the lowest prevalence rate respectively.

Table 1. Prevalence of Parasites of Field Crickets (*Brachytrupes membranaceus*) in the Eastern Zone, Kogi State

<u>Sample</u>	<u>No. Examined</u>	<u>No. Infected</u>	<u>Percentage</u>
<i>B. membranaceus</i>	165	76	46.1

Table 2. Prevalence of Different Parasites Species in Field Crickets

<u>Parasites</u>	<u>No. Infected</u>	<u>Percentage</u>
<i>Spinochordodes</i> sp.	17	10.3
<i>Paragordius</i> sp.	59	35.8
Total	76	46.1

Table 3. Distribution of Parasites of Field Crickets by Sex

<u>Sex</u>	<u>No. Examined</u>	<u>No. Infected</u>	<u>Percentage</u>
Male	89	52	31.5
Female	76	24	14.6
Total	165	76	46.1

Table 4. Monthly Prevalence of the Parasites of Field Crickets

<u>Months</u>	<u>No. Examined</u>	<u>No. Infected</u>	<u>Percentage</u>
July, 2016	62	25	15.2
Aug., 2016	49	28	17.0
Sept., 2016	54	23	13.9
Total	165	76	46.1

DISCUSSION

The results of the current study has shown a high prevalence rate of 46.1% gut parasites of Field Crickets (*Brachytrupes membranaceus*) in the Eastern Zone of Kogi State, North-Central, Nigeria. The high prevalence of these parasites infestation might be due to favourable edaphic and biotic factors that might favours the natural infection of field crickets by the parasites. It has been reported that the tropical climatic conditions especially rainfall, temperature, and relative humidity also favours the development and survival of parasitic nematomorphs larvae to infective stage (Boggs, 2012). In this study, species and environment also play an important role in the prevalence and worm burden of parasitic nematomorphs in the alimentary canal of field crickets (*Brachytrupes membranaceus*). This might explain the high prevalence rate observed in this study. This study clearly revealed that *Paragordius* sp. appear to occur in abundant numbers with highest prevalence rate of 35.8%, while *Spinochordodes* sp. had 10.3% respectively. This might be attributed to the physiological contents of field crickets alimentary canal, which favours their reproduction, as well as a wide hosts range usually exhibited by most *Paragordius* species (Cheng, 1993).

Therefore, the comparative incidence of gut parasites of Field crickets such as *Paragordius* sp. and *Spinochordodes* sp. are quite remarkable. These gut parasites encountered in this study have been reported in different part of the world (Kagei *et al.*, 1966; Ali-Kham and Ali-Khan, 1977; Weis and Yang, 1981; Uchikawa *et al.*, 1987; Poinar, 2008). The male field crickets were more infected than the female, this may be attributed to the voracious feeding and straying habits of the male as compared to the female (Alexander, 1961; Poulin, 1996a; Senimons and Zuk, 1994; Duron *et al.*, 2008).

The month of August had the highest prevalence rate 17.0%, among the three months that the research was carried out. The high prevalence of gut parasites observed in August, 2016, might be attributed to high relative humidity, rainfall and low ambient temperature that characterized the month of August in the Eastern Zone of Kogi State. It has been reported that insects inhabiting in moist soil get infection of parasites from their food and thus have a constant association of microorganisms in gut or in various tissues (Eutick *et al.*, 1978.). The most striking implication of this investigation, suggest that helminthic infection, may be a public health threat to people in the area, who cherish field crickets as a special delicacy.

CONCLUSION AND RECOMMENDATIONS

The direct harmful effects could result from the consumption of raw or improperly prepared field crickets, since they have been incriminated as the reservoir hosts of these helminthes parasites. Therefore, adequate preventive measures such as proper roasting and frying, should be adopted by the people who consumed them. Also, further research should be embarked upon to determine the effective methods of ameliorating the zoonotic effects of helminthes harboured by field crickets.



Plate 1. Larva of *Paragordius* sp. (X100)



Plate 2. Larva of *Spinochordodes* sp. (x100)

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