

**PREVALANCE OF GASTROINTESTINAL PARASITES OF CANE RAT
(*THRYONOMYS SWINDERIANUS*) IN GYAWANA ECOSYSTEM, ADAMAWA
STATE, NIGERIA**

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Abstract

*Study on the prevalence of gastrointestinal parasites of cane rat (*Thryonomys swinderianus*) in Gyawana ecosystem, Lamurde Local Government Area, Adamawa State was carried out to determine the prevalence of gastrointestinal parasite of cane rat (*T. swinderianus*) and to compare the prevalence of gastrointestinal parasite by sex. A total of sixty (60) male and female cane rats (*T. swinderianus*) thirty (30) male and thirty (30) females were trapped from Gyawana ecosystem (sugar cane farm) using mouse glue trap. The cane rats (*T. swinderianus*) were sacrificed with chloroform, then dissected and the gastrointestinal samples were obtained and processed. Following direct smear method for fecal examination was performed and stool specimen was processed following a formal-ether standing operation procedure. The gastrointestinal parasites were identified on the basis of morphological characteristics. The analysis of variance (ANOVA) was used to compare the percentage of various gastrointestinal parasites of cane rat (*T. swinderianus*) during the period of study. Chi-square was also used to test for the differences by gender at $P > 0.05$. The result reveals seven different species of gastrointestinal parasites (*Girdia* species, *Ascaris* species, *Strongyloides* species, *Coccidia* species, *Ancylostoma* species, *Entamoeba* species and *Trachuris* species) were observed in the gastro intestine of cane rat (*T. swinderianus*). *Ascaris* species has the highest prevalence of gastrointestinal parasites 27 frequency, followed by *Ancylostoma* species with 19 frequency and the least is *Trachuris* species with 3 frequency. Thus the prevalence of gastrointestinal parasites of cane rat (*T. swinderianus*) in the study area, are in this order of *Ascaris* sp.>*Ancylostoma* sp.>*Entamoeba* sp.>*Girdia* sp.>*Strongyloides* sp.>*Coccidia* sp.>*Trachuris* sp.. There was significant difference between the species of gastrointestinal parasite of cane rat (*T. swinderianus*) in Gyawana ecosystem at ($P < 0.05$). The result further shows that, 40(80.00%) of the cane rats were infected with several species of parasite. The males have high prevalence of gastrointestinal parasites with 25(83.33%), compare with female with 23(76.67%) prevalence of gastrointestinal parasites. Nevertheless, there was no significant difference between sex and gastrointestinal infection at ($P > 0.05$). The researchers therefore recommended that consumption of cane rat should be minimized in order to avoid the transmission of these gastrointestinal parasites to human. Further study should be carried out on other organisms that are consumed as bush meat from the study area*

Key Words: Prevalence, Cane rat, Gastrointestinal, Parasite, Gyawana, Ecosystem

INTRODUCTION

A cane rat (*Thryonomys swinderianus*) is in a genus of rodent found throughout Africa south of the Sahara, the only members of the family Thryonomyidae. They are eaten in some African countries and are pest species on many crops (Woods *et al.*, 2005). The cane rat (*T. swinderianus*), is a wild, herbivorous, hystricomorphic rodent, reputed for its tasty and high-

quality meat (Asibey and Addo, 2000). In the West African sub-region, it is a potential food source providing high quality protein for both urban and rural populations (Addo *et al.*, 2007). Consequently, cane rats are now being domesticated and captive-reared in parts of West Africa where they are sometimes referred to as micro livestock (Karikari and Nyameasem, 2009).

The cane rat lives by reed-beds and riverbanks in Sub-Saharan Africa and can grow to nearly 2ft (0.61 meter) in length weighing as much as 8.6 kg (Van der Merwe *et al.* 2000). It has rounded ears, a short nose, and coarse bristle hair. The forefeet are smaller than the hind feet. Cane rats (*Thryonomys swinderianus*) have a tendency to adopt plantations as habitat, feeding on agricultural crops such as maize, wheat, sugarcane and cassava, thereby earning the label 'agricultural pest'. The cane rat is said to be sexually matured at 7 months of age and at the weights of 1.6 kg and 2.1kg for male and female respectively, they are the second largest rodents in Africa (Adu and Yeboah, 2003). They feed on roots, reeds and the stems of grasses along rivers and in other moist areas. Grasses eaten include Couch Grass (*Cynodon dactylon*), Swamp Grass (*Hemarthria altissima*), Elephant Grass (*Pennisetum purpureum*) and Guinea Grass (*Panicum maximum*). While grasses are their principal food, they raid crops (such as maize, millet, sorghum, wheat, and sugar cane) and cause damage by cutting the stems at their base with their broad sharp incisors (Skinner and Chimimba, 2005).

The ecology of *T. swinderianus* is a typical reed beds or in areas of dense, tall grass with thick reed or cane-like stems, typical of riverine and other similar habitats. For example, in the Free State Province, it is associated with reed beds and dense grass around rivers, streams, vleis and pans, as well as irrigation dams, some water canals and mine dams (Van der Merwe and Avenant, 2004). It also uses thatching grass, which is of a similar reed-like structure. It is seldom found far from water and tends to inhabit the warmer areas of South Africa, although it has adapted to the winters of the Highveld (Van der Merwe and Avenant, 2004). Skinner and Chimimba (2005), note that agricultural crops (such as maize, wheat and sugar cane) have greatly improved the habitat for this species *T. swinderianus*, such that it has become an agricultural pest in some regions.

MATERIALS AND METHODS

Description of the study area

The study was carried out in Gyawana ecosystem, Lamurde Local Government Area, Adamawa State of Nigeria. Gyawana is located at latitude 9°.35'N and longitude 11°.55'E and is 35meters above sea level. Lamurde Local Government Area lies between longitude 9°.36'03.92"N and latitude 11°.47'36.25"E at an elevation of 137 meters above the sea level and has a population of 77,522 people (Adebayo, 2012). Adamawa State is located in the North Eastern part of Nigeria, and lies between latitudes 7° and 11°N and between longitudes 11° and 14°E. It is on an altitude of 185 meters above sea level and covers a land area of about 39,741km². The State shares boundaries with Taraba State in the south and west, Gombe State in the northwest, Borno State in the north and an international boundary with the Republic of Cameroon along its eastern border.

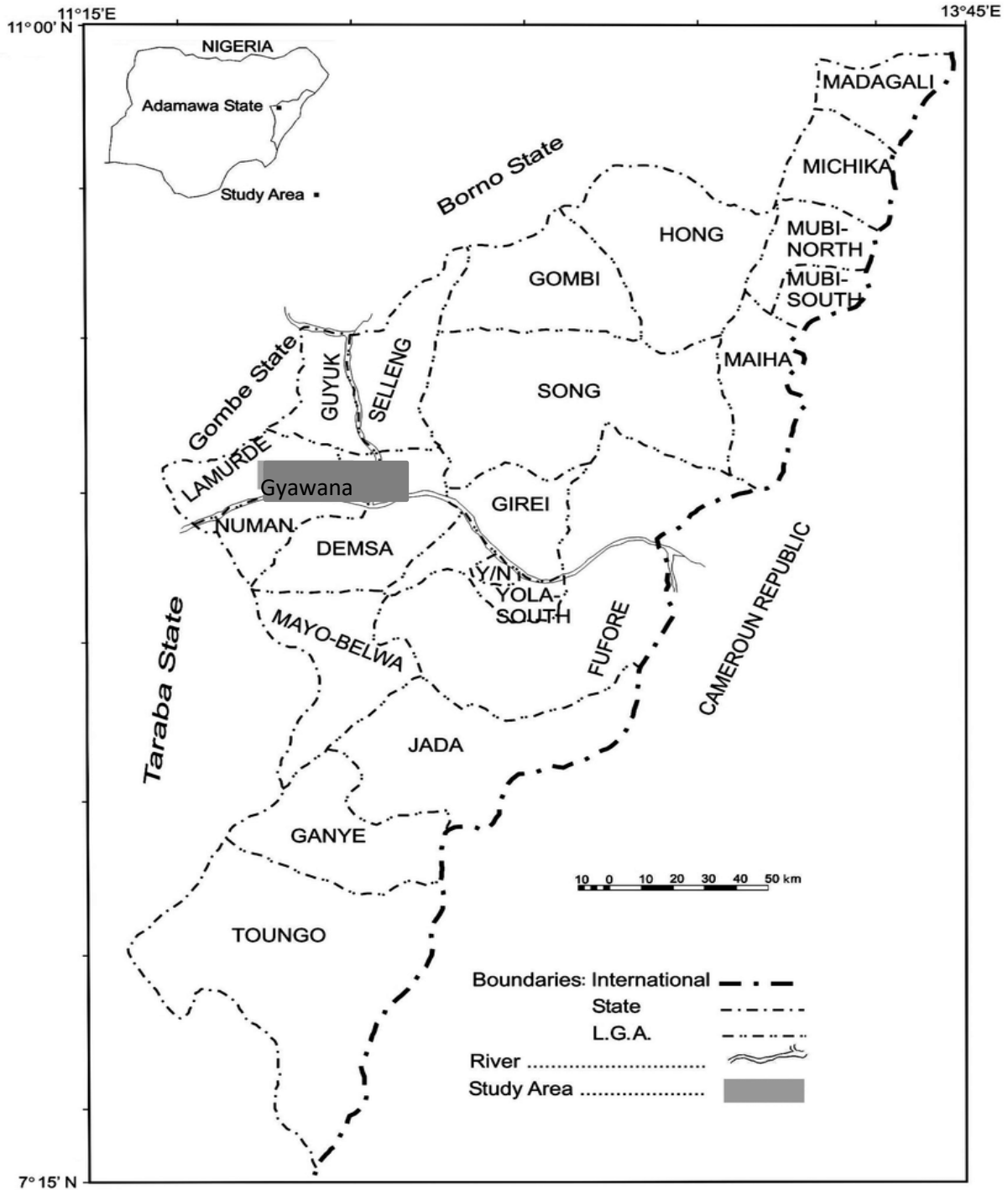


Figure: Map of Adamawa showing the study Area

Sampling techniques

The study was conducted for a period of three (3) months (February to April 2022). Cane rat (*Thryonomys swinderianus*) were collected fortnightly from sugar cane farms in Gyawana ecosystem, Lamurde Local Government Area, Adamawa State, Nigeria. A total of sixty (60) adult male and female rats (*T. swinderianus*) were collected making a sub total of forty (20) per month from cultivated areas (sugar cane) near streams and rivers. Thirty (30) of each sex

of *Thryonomys swinderianus* were trapped using mouse glue trap from the study area as described by (Iyanda and Adeomi, 2013; Buba *et al.*, 2018).

Laboratory analysis

The trapped cane rats (*T. swinderianus*) were taken to the Laboratory of the Department of Zoology, Adamawa State University, Mubi and they were sacrificed, dissected and the intestine were collected for analysis based on their sex. Using an applicator stick, the fecal spacemen were collected from the intestine and transferred into a clean sample bottle for microscopic examination as described by Cheesbrough (1987). Also formal-ether concentration technique was used as in (Arcari *et al.* 2000).

Direct microscopy technique

Direct smear method for fecal examination was performed; using glass rod, placing 2gms of the fecal sample on a clean grease free slide, a drop of normal saline was added to the sample, emulsified and debris removed. Cautiously and gently the smear was covered with cover slip avoiding air bubble and over flow of the samples. The smear was mounted onto a phase contrast microscope and examined under 10x and 40x objective lens. The intestinal parasites were identified on the basis of morphological characteristics as in (Opara and Fagbemi (2008).

Formal-ether concentration method

Stool specimen was processed following a formal-ether standing operation procedure. About 1g of fecal sample was transferred into a clean centrifuge tube containing 7ml of 10 percent formalin solution and mix thoroughly using Vortex mixer. The suspension was filtered through a sieve into a 15ml centrifuge tube. Then 4ml of diethyl ether was added to the formalin solution. The content was centrifuged at 3000rpm for 1 minute. The supernatant was discarded and smear was prepared using a slide from the sediment. Finally, the slide was examined under a microscope with magnification power of 10x and 40x objective lens for the presence of intestinal parasite. The intestinal parasites were identified on the basis of morphological characteristics as in (Opara and Fagbemi (2008).

Statistical Analysis

The analysis of variance (ANOVA) was used to compare the percentage of various gastrointestinal parasites of cane rat (*T. swinderianus*) during the period of study. Chi-square was also used to test for the differences by gender.

RESULTS

From the sixty (60) cane rats (*Thryonomys swinderianus*) sampled in Gyawana ecosystem, the result reveals seven different species of gastrointestinal parasites (*Girdia* Sp., *Ascaris* Sp., *Strongyloides* Sp., *Coccidia* Sp., *Ancylostoma* Sp., *Trachuris* Sp.) were recovered from the gastrointestinal of cane rats (*T. swinderianus*) and were presented in Tables 1 and 2.

Table 1: Prevalence of Gastrointestinal Parasites of *T. swinderianus* in Gyawana Ecosystem

S/N	Species	Frequency	Male frequency	Female frequency
1	<i>Girdia</i> Sp.	11	3	8
2	<i>Ascaris</i> Sp.	27	13	14
3	<i>Strongyloides</i> Sp.	9	4	5
4	<i>Coccidia</i> Sp	4	1	3
5	<i>Ancylostoma</i> Sp.	19	4	15

6	Entamoeba Sp.	16	8	8
7	Trachuris Sp	3	1	2

(P < 0.05)

Prevalence of gastrointestinal parasites of *T. swinderianus* in Gyawana Ecosystem

The results of gastrointestinal parasites of *T. swinderianus* in Gyawana ecosystem shows that, *Ascaris* species has the highest prevalence rate of gastrointestinal parasites with 27 frequency. Followed by *Ancylostoma* species with 19 frequency and the least is *Trachuris* species with 3 frequency, thus the prevalence of gastrointestinal parasites of cane rat (*T. swinderianus*) in Gyawana ecosystem are in this order of *Ascaris* species > *Ancylostoma* > *Entamoeba* species > *Girdia* species > *Strongyloides* species > *Coccidia* species > *Trachuris* species. There was significant difference between the species of gastrointestinal parasite of cane rat (*T. swinderianus*) in Gyawana ecosystem at (P < 0.05).

Table 4: The Prevalence of Gastrointestinal Parasites of *T. swinderianus* by Gender in Gyawana Ecosystem

Sex	NO. Examined	NO. Infected	NO. Uninfected	% Infected
Male	30	25	5	83.33%
Female	30	23	7	76.67%
Total	60	48	12	80.00%

P<0.05

Prevalence of Gastrointestinal Parasites in Cane rats (*T. swinderianus*) by gender in Gyawana Ecosystem

The result of the prevalence of gastrointestinal parasites of cane rats (*T. swinderianus*) by gender in Gyawana ecosystem, Adamawa State, revealed that, 40(80.00%) of the cane rats were infected with several species of parasite. The males have high prevalence of gastrointestinal parasites with 25(83.33%), compare with female with 23(76.67%) prevalence of gastrointestinal parasites. Nevertheless, there was no significant difference between gender and gastrointestinal infection at (P < 0.05)

Discussion

The finding of this research work shows that there was seven different species (*Girdia* specie, *Ascaris* specie, *Strongyloides* specie, *Coccidia* specie, *Ancylostoma* specie, *Trachuris* specie) of intestinal parasites observed in both male and female in cane rat (*Thryonomys swinderianus*), 80.00% of the *T. swinderianus* were infected. The males have higher rate of infection with 83.33%, compared to the females with 76.67%. The result of this study agrees with previous studies carried out in Ekumfi central region of Ghana (Yeboah and Simpson, 2001; Ajayi, 2007), who identified *Trichuris* sp., *Ancylostoma* sp. and *Giardia* sp., were among intestinal parasites reported in the cane rat. These parasites can be transmitted to their younger ones and other mammals, including humans who may come into contact with them (Andrew, 2009).

This result of this study also correspond with the findings of (Opara & Fagbemi, 2008), who carried out research on the Gastrointestinal Helminth parasites of the wild Grasscutter (*Thryonomys swinderianus*, *Temminck*) in Imo State, Nigeria, where *Ascaris* sp. and *Schistosoma haematobium* have high prevalence rate. And in this present study *Ascaris* sp

has the highest prevalence rate. There was no *Schistosoma haematobium* observed in this present study but present in the study carried out by Opara and Fagbemi, (2008). The differences in parasite diversity may be due to the geographical location or the species of the rat studied.

The finding of this study was similar to those observed in the study conducted by (Futagbi *et al.* 2010 and Okorafor, *et al.* 2012), on intestinal parasites of cane rats (*T. swinderianus*) from Kwaebibirem District of the Eastern Region of Ghana and also Oyo State, South-Western Nigeria respectively, where they observed several species of parasite found in gastro intestine of cane rat in their studies.

Conclusion

The study on the prevalence of gastrointestinal parasite of cane rat (*T. swinderianus*) in Gyawana ecosystem, the result reveals that multiple infections are common in the gastro intestine of cane rat (*T. swinderianus*). Among the parasites found in this order of prevalence: *Ascaris* species>*Ancylostoma*>*Entamoeba* species>*Girdia* species> *Strongyloides* species>*Coccidia* species>*Trachuris* species. The male have higher prevalence rate of infection compared to the female cane rat (*T. swinderianus*).

Recommendation

Base on the findings of this research work, the researchers thus recommend that, consumption of cane rat (*Thryonomys swinderianus*) as bush meat should be minimized and well screened for possible parasites before consumption to avoid further transmission of these parasites to human. Further study should be carried out on gastrointestinal parasite of other organisms that are consumed as bush meat from the study area.

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