

# Biological Control of Tsetse fly Project (BICOT) in Lafia Local Government Area of Nasarawa State, Nigeria, 1984 – 2000.

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## Abstract

In 1980 the Federal Department of Livestock and Pest Control Services through the biological control of tsetse fly project (BICOT) was actively involved in tsetse fly control eradication using a combination of tsetse population reduction and sterile inset technique (SIT). The project area covered approximately 1,500sq. Km of land and lay within the Lafia local government Area (LGA) of Nasarawa State. The area was virtually freed of *Glossina palpalis palpalis*, and to some extent *G. tachinoides* by December 1984. By 1987, however sterile male releases were suspended, and remained so until now due to lack of funding. In order to ascertain the present situation in the area as a way of estimating how long such a cleared area could remain free of tsetse before reinvasion, the present study was conducted; this being 16 years after the eradication of *G.p palpalis* and removal of over 90% of *G. tachinoides*, which sell the main tsetse species in the area. At least 10 biconical traps were set at an interval of about 250 meters along each river/stream in the study area. Captured flies were dissected to identify those, which are positive for trypanosomes. In all, 466 tsetse flies were caught out of which 454 were *G.p. palpalis* while the remaining 12 were *G. tachinoides*. The result of dissection showed that 9(1.9%) of the total flies caught were positive for trypanosomes with all being *T.vivax*. IAll infected flies were *G.p. palpalis*. The small number of *G. tachinoides* caught could be responsible for the absence of infection in this species during the study period.

## INTRODUCTION

Tsetse transmitted trypanosomosis is classified as severe in the majority of the 37 sub-Saharan countries affected where it figures among the first three priority veterinary diseases (FAO, 1992). Animal trypanosomosis and tsetse flies (*Glossina*) are widely distributed in Nigeria from latitude 4 N to 13 N, an area covering all the five-agro ecological zones of the Country (Onyiah, 1997). African animal trypanosomosis has also been described as one of the most important livestock diseases endemic to the African continent, and a major factor constraining livestock production in Nigeria (Ikede, 1989 and Urquhart, 1974).

The key characteristics of trypanosomosis infection are the presence of trypanosomes in the blood and anaemia, caused by the destruction of red blood cells induced by the parasites. Previous studies have shown that the key indicators of trypanotolerance are the abilities to limit the number of parasites in the blood (parasitaemia control) and maintain relatively normal levels of red blood cells (anemia control) when infected (Anon, 1991).

According to Anon (1991), previous work in the African Trypanotolerant livestock Network has shown that the degree of anaemia in trypanosome-infected cattle, as measured by the packed red cell volume (PCV) in the blood, is correlated with such production traits as reproductive performance and growth. Animals able to maintain high PCV levels are more productive than those with lower PCV values. The report further stated that in 1989, studies have demonstrated that an animal's ability to maintain high PCV levels when infected with trypanosomes is a heritable trait.

In 1980, the Federal Department of Livestock and Pest Control Services through the biological control of tsetse fly project (BICOT) was actively involved in the control/eradication of tsetse flies. The project was situated in Lafia Local Government Area of Nasarawa State because of the huge agricultural (especially livestock) potentials in the area. Before the establishment of the project, the full utilization of livestock potentials was greatly affected by tsetse flies. Biological control is the use of living creatures or organisms such as parasites and predators, to control or eradicate other creatures, which are harmful (Davies, 1977).

The most important parasites of tsetse are those that attack the pupae and the main ones are small flies e.g. *Mutilla glossinae*.

According to (FAO, 1992), in order to control any pest species, it is necessary to have a good understanding of its biology, behaviour and population dynamics - that is the natural factors, which affect distribution and abundance. The most widely recognized type of biological control is the sterile insect technique (SIT). Here the means are provided by which the tsetse can eradicate itself; it may also be called an autocidal (self-killing) method of control (Davies, 1977). Anon (1985) reported that the male flies were sterilized by irradiation as young flies by exposure to 12 krad from 60 cobalt source.

According to Oladunmade (1990), the biological control of tsetse flies using sterile insect technique (SIT) was introduced on an experimental level. The entire area covered approximately 1500km<sup>2</sup> with *Glossina palpalis palpalis* and *G. tachinoides* as the target tsetse species.

Using a combination of fly reduction and sterile insect techniques, the project achieved its main objective and by December 1984, tsetse population had been reduced virtually to zero (Anon, 1985). However by 1987, sterile male releases were suspended, (Anon, 1988) due to lack of funding and so the achievement could not be consolidated in spite of the positive report of the review panel (Ilemobade et al, 1985). The present study (Oluwafemi, et al, 2000) therefore was carried out to ascertain the present situation in the area as a way of knowing how long such a cleared area can remain free before reinvasion.

## **MATERIALS AND METHODS**

### **STUDY AREA**

The study was carried out in the Biological control of tsetse fly project (BICOT) area in Lafia Local Government Area of Nasarawa State, Nigeria, covering approximately 1500 km<sup>2</sup> and within the Nasarawa Agricultural Development Programme (NADP) area. The area is one of the most productive agricultural zones of Nigeria, where the presence of tsetse and trypanosomosis can make significant difference in the level of productivity. Presently, two species of *Glossina* that are known to be present in the area are: *G.p. palpalis* and *G. tachinoides*, which are generally found along river courses. Nasarawa State was originally part of Plateau State and is located next to the Federal Capital Territory of Abuja and in the central area of middle belt region along

latitude 7 and 10 east.

### **DATA COLLECTION**

The study area, which has been divided into four blocks from the beginning of the project was effectively covered by setting at least 10 biconical traps along each of the river/stream within each block on a 24-hour exercise. Traps were set at designated sites at an interval of about 250 meters. Tsetse flies caught at the end of each 24-hour trapping were taken to the laboratory (Lafia college of Agriculture's Laboratory) for dissection. Fresh flies were dissected on daily basis during the study period to examine for the presence of trypanosomes in their system. The proboscis, salivary gland and the mid-gut of the flies are the areas examined for the presence of trypanosomes. These parts were examined with the aid of both dissection microscope and compound microscope.

Blood samples were also collected from 200 slaughter cattle and another 200 head of settled cattle in the area. The samples were examined using standard parasitological techniques, which include thin and thick measures, as well as haematocrit centrifugation techniques.

### **RESULTS**

The total number of tsetse fly caught was 466 out of which 454 were *Glossina palpalis palpalis* while the remaining 12 were *G. tachinoides*. Out of the 454 *G.p. palpalis* recorded, 196 were males and 358 were females, while out of the *G. tachinoides* caught, 5 were male and 7 were females. The result of the dissection showed that 9(1.9%) of the total flies caught were positive for trypanosomes, with all being *T.vivax*. All infected flies were *G.p. palpalis*. The small number of *G. tachinoides* caught could be responsible for the absence of infection in this species during the study period.

The results of parasitological examinations showed that 18 (9%) and 21 (10.5) from settled cattle and slaughtered cattle respectively were positive for various trypanosomes species. There was, however no significant differences ( $p>0.05$ ) between the numbers of cases detected in settled as against slaughter cattle. Most of the infection in settled cattle (67%) and slaughter cattle (81%) were due to *T.Congolense*.

**Figure 1**

Summary of Tsetse flies population and trypanosome infections recorded during the study period

LOCALITY (RIVERS)	G.t	G.p	TOTAL	NO POSITIVE	TRYPANOSOME SPECIE	REMARK
Akuni	9	7	16	0		
Maiakuya	0	0	0	0		
Maisamari	0	23	23	1	<i>T. vivax</i>	
Tsakwa	0	12	12	1	<i>T. vivax</i>	
Achiba East	0	15	15	1	<i>T. vivax</i>	
Achiba West	0	8	8	0		
Dungu West	0	7	7	0		
Dungu South	0	4	4	0		
Feferuwa	0	28	28	0		
Ganye One	0	61	61	1	<i>T. vivax</i>	
Ganye Two	0	38	38	1	<i>T. vivax</i>	
Ganye Three	0	44	44	1	<i>T. vivax</i>	
Ehula	0	55	55	1	<i>T. vivax</i>	
Amba	2	0	2	0		
Dutse	1	4	5	0		
Bukankwato	0	23	23	0		
Kurikiyo	0	27	27	1	<i>T. vivax</i>	
Ombi	0	7	7	0		
Agabija	0	15	15	0		
Awuma	0	63	63	1	<i>T. vivax</i>	
<b>Grand Total</b>	<b>12</b>	<b>454</b>	<b>466</b>	<b>9(1.9%)</b>		<b>1.4-3%(1.9%)</b>

Key: G. t = *Glossina tachinoides*

G. p = *Glossina palpalis palpalis*

## DISCUSSION AND CONCLUSION

In the present study, an attempt was made to assess the situation of tsetse and bovine trypanosomosis in an area where *G.p. palpalis* and to a greater extent *G.tachinoides* were claimed to have been eradicated sixteen years ago. The study showed clearly that the area has almost reverted to the position it was in 1980 when the project commenced.

The results showed that:

A cleared area in the particular vegetation zone, may remain free and constitute no health hazard to livestock for a period of about 15years, if no barriers exist or trapping is continued.

Judging from the investment in the eradication programme on BICOT, the fifteen years respite is very short. BICOT of course was conceived to be expanded and active monitoring continued. Regrettably lack of funds makes this impossible.

In order to ensure that the benefits justify the cost of eradication a barrier needed to be erected to prevent reinvasion, which is expensive, or progressive eradication is continued.

Africa faces the major problem of how to feed its people. The solution to the problem is not simple but undoubtedly one component is the alleviation of the constraint that trypanosomosis places on agriculture (Connor, 1989). The question was posed by Ikede (1986) “is current emphasis misplaced” in the context of trypanosomosis and livestock production in Africa? He concluded that the existing knowledge needs to be applied to control trypanosomosis and improve livestock production.

Finally, trypanosomosis controls need to be integrated with improved management to have maximum impact. Several control methods exist but they all need to be monitored to determine their efficiency and to enable necessary modification.

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