Austin Journal of Veterinary Science & Animal Husbandry

Open Access

Austin Publishing Group

Short Communication

Determining the Distribution of Tsetse Fly in Gurage Zone, Enemorenaener District, SNNPR of Ethiopia

Tamirat T*

Department of Quality and Safety Assurance Directorate, Microbiology Laboratory Team Leader, Ethiopian Meat and Dairy Industry Development Institute, Ethiopia

***Corresponding author:** Tekilegiorgis Tamirat, Department of Quality and Safety Assurance Directorate (Meat, Honey and Feed), Microbiology Laboratory Team Leader, P.O. BOX 1573 Bishoftu, Oromia, Ethiopia; Tel: +251911003575; Email: tamoplus@gmail.com

Received: November 10, 2021; **Accepted:** December 01, 2021; **Published:** December 08, 2021

Abstract

The study was conducted in Gurage zone, Enemorenaener district of Southern Nation and Nationalities people's regional state of Ethiopia to assess the apparent densities and distribution of tsetse flies. First questioner survey was conducted and 67% of the asked people says trypanosomiasis is predominant disease in the study area. For entomological survey, 20 NGU traps were deployed and the apparent fly density was determined. The assessment of tsetse flies indicated that the *Glossina morsitance* and *Glossina paladipes* were major biological vectors for bovine trypanosomiasis in the study area with apparent densities of 1.85 fly/trap/day. Other biting flies (tabanides and stomoxys) were also collected indicating the possibility of mechanical transmission. The result of the questioners and present study revealed that tsetse fly is most important vector in the study area. Therefore it requires further detailed studies and integrated tsetse flies vector control as well as a high commitment of the community is required to fully and willingly participate in the operation to effectively control and finally eradicate tsetse flies.

Keywords: Apparent density; Enemorena ener district; SNNPRS and Tsetse fly

Introduction

Tsetse fly (*Glosina* species) is large biting fly that inhabit about 10 million km^2 of area in 37 sub-Saharan Africa countries which constitute about 37% of the continent considered that 7 million km^2 of this area would otherwise be suitable for livestock or/and mixed agricultural development where it is not for Trypanosomosis [1]. These area could theoretically support additional 140 million cattle as well as equivalent number of sheep, goat and relieve pressure on peripheral areas [2]. About 30% of the 150 million cattle in countries are affected by tsetse are exposed to the disease [3].

The epidemiology of African animal trypanosomiasis is governed by the distribution of their vectors as a whole and especially by that of tsetse flies (*Glossina* species). In tropical Africa, tsetse ecology is confines roughly between 15^{0}N-25^{0}S latitude where the disease as well occurs, although mechanically transmitted trypanosomiasis is distributed wider than this limit [4]. Tsetse fly as the primary vector of trypanosomes in sub-Saharan Africa is, thus, incriminated as the major and continuing threat to the efforts aimed at improving the livelihoods of rural communities [5].

The four species are members of the salivarian group of Trypanosome and are transmitted cyclically *via* the mouth part of tsetse flies, hence the name salivarian Trypanosome. The three groups of the *Glossina*, the savannah and the rivrian are the most important vector since they inhibits areas suitable for grazing and watering. Tsetse flies in Ethiopia are confined to the southern and western region between longitude 33^{0}E and 38^{0}E and latitude 5^{0}N and 12^{0}N. The infest area in which together amount of 220,000 tsetse infest areas lie in the lowlands and also in the river valley of Abay (Blue nile, Baro, Akobo, Diddesa, Ghibe and Omo) [6].

The vector, tsetse fly, can be classified in to the order Diphtheria (the two winged flies), family Glossinidae and within the genus, *Glossina*. There about 23 species and 8 sub species of *Glossina* identified so far [4,7]. From morphological point of view tsetse flies are elongated and roboust of varies shade of brown ranging from yellowish to grayish to dark or blackish brown color and about 6 to 16 mm long excluding the proboscis. Males are smaller than females [8].

The general distribution of tsetse flies determined principally by climate and influenced by the altitude, vegetation and presence of suitable host animals has been known for a long time [4]. Each of these factors may directly affect the birth, death or migration rate of the vector and thus the population size [9]. The limit of distribution is closely correlated with the tropical savanhan (summer rain) climate, which follows the 950mm annual rain fall. Altitude influence tsetse distribution through its effect on climate, particularly temperature [4] in Ethiopia, 1600 *m.a.s.l* was considered the upper altitudinal limit to tsetse distribution according to [6]. Subsequently, however, *G. paladipes* was found at altitude up to 2200m [10]. Therefor studies have needed and not yet been carried out on the distribution of tsetse fly in the study area.

The present study was conducted on identification of tsetse fly in two selected kebele and peasant association of gurage zone enemore ener district. It is located on the equator at 8^{0}2'11" N^0 latitude and 37^{0}5'1" E^0 longitude. The altitude of the study area ranges from 1000 to 3000 *m.a.s.l* and its total area is estimated to be 195,345,013 hectare of land. The distribution of the rain is bio medial with short rain from January to April and high rain from June to September. The average annual rain fall is 950mm and Enemornaener district and its surrounding is characterized by with minimum and maximum temperature ranging from 6 to 28 respectively.

Citation: Tamirat T. Determining the Distribution of Tsetse Fly in Gurage Zone, Enemorenaener District, SNNPR of Ethiopia. Austin J Vet Sci & Anim Husb. 2021; 8(3): 1084.

Table 1: Tsetse density and species of glossina.

Site of Deployment	No. of Traps	Altitude	Species	Types of Flies			Fly/Trap/Day
				M	F	Total	
Shmoro	10	1120-1159	*G.morsitance*	-	6	6	1.05
			G.paladipes	6	9	15	
			Stomoxey	-	-	7	
			Tabanides	-	-	6	
Jatu	10	1159-1180	*G.morsitance*	2	5	7	0.8
			G.paladipes	3	6	9	
			Stomoxey	-	-	3	
			Tabanides	-	-	7	

To assess the apparent densities, distribution and species of tsetse flies and other biting flies' survey conducted NGU traps baited with aceton and three-week-old cow urine [11] cds used for assessing the density. Site selection was done to include suitable tsetse live savanna area, rift valley, livestock grazing areas and watering points and vicinity to assumed wild game reserved areas. In all study sites a total of 20 NGU traps, 10 traps in shumoro river and 10 traps in jatu river side were deployed early in morning and manifested for 48hrs perceive flies densities traps were sited preferably in slender with good visibility and at suitable intervals depending on the ecology of the target species. *Glossina* species can detect odors from about 50-100 meters. So the traps were spaced at about 100 meter interval. During trapping acetone dispended from open vials while cow urine from open bottles in to the open bottle of cow urine apiece of tissue paper was included to tactile odor diffusion. All odors were placed on the ground about 30 cm up wind of the trap. The trap poles were grassed to exclude insect predators like ants [11].

The different flies cached in each trap were counted, identified and analyzed. The species of tsetse fly was identified based on the characteristics, morphology [6,12] other biting flies were spread according to their morphology characteristics such size, color, wing venation structure and proboscis at the genus level [13].

Sexing was done just by observing the posterior end of the ventral aspect of the abdomen by microscopic lens as a result male flies easily identified by enlarged hypopygium in the posterior ventral part of the abdomen. The fly apparent densities is the mean catch in traps deployed expressed at the number of fly catch per traps per day [14].

Parasitic diseases like mange mites, ticks, gastrointestinal helminthiasis and trypanosomiasis, bacterial diseases including blackleg, anthrax, contagious bovine pleuropneumonia, caprine pleuropneumonia, and mastitis were listed as most important livestock diseases in the area. From the questionnaire it was indicated that trypanosomiasis was the most important and the first cause of morbidity and mortality of cattle in Enemorena ener district, even after control program has been conducted for years by different stakeholders. Of these listed diseases, from 100 farmers 67(67%) of the interviewed farmers ranked trypanosomiasis as the priority disease affecting their cattle and the risk factor is lack of feed in dry season

During entomological survey two species of tsetse fly was identified *Glossina paladipes* and *G. morsitance*. A total of 37 tsetse flies were caught and identified at shumoro (river side), jatu (pastural land area). The mean catch *G. morsitance* and *G. paladipes* at shumoro (river side) was 0.25 and 0.75 flies/trape/day were at 0.35 and 0.45 flies/trap/day at the main catch jatu (pastural and landarea) respectively. The overall mean catch of *G. morsitance* and *G. paladipes* in shumoro and jatu 0.65 and 1.2 flies/trap/day respectively.

A total of 60 flies were captured out of which 61.6% belong to tsetse, 21.4% *tabanus* and 16.8 *stomoxey*. The *tabanide* fly group comprises *tabanus*, *haematopota* and *chryoops* while the muscida group belongs to stomoxys. From tsetse fly trapped female occupied large ratio out of total 37 flies captured 70.7% flies were females and the 29.73% comprises male.

On the present entomological survey *G. morsitance* and *G. paladipes* are the two species of tsetse detected in the study area with the apparent densities of 1.85 flies/trap/days and overall mean catch of *G. morsitance* and *G. paladipes* is 0.65 and 1.2 flies/trap/day respectively. This result shows closer apparent densities to different works. According to [14] the mean fly catch was 1.42 in gihibe valley the result is closer to this study and another report by [15] in Gamo gofa and Dawero zone infested with *G. paladipes* with apparent density of 1.8 flies/trap/days this was little higher than our finding. On the other hand the report that the Great Rift Valley was infested with *G. paladipes* with apparent density of 2.4 flies/trap/days and 0.64 flies/trap/days in wet dry season [16] our finding ranges in between 0.64 and 2.4 flies/trap/day. The overall 1.85 flies/trap/day in this study was aligned with the finding of [17] which is 1.82 flies/trap/day. The variations in flies densities may be due to the area of fly catch which favored trapping ample amount of flies and temperature below 15°C in active and about 35°C they seek refuge in rot holes in the trees and animal burrow and deep tissue in the bark, where they remain inactive. Humidity is also important factor for pupa and adult fly development. Cumulative effect long rainy season or dry season is taught to influence advanced and recession in tsetse population [4].

During the study period, for tsetse flies collected the sex ratio was assessed. Greater ratio of female to male (2.1) was recorded and similar results reported by other workers [16,18] in Somali and southern Ethiopia respectively. Leak [4] reported that in un based sample females would comprise 70-80% of the mean populations. The higher population of female may be attributed to the fact they live longer (mean female fly span being 8 weeks than male about 4 weeks). So that more female could be caught.

The result of the study revaluated that tsetse fly is the most important problem for agricultural activity and animal production in the study area acting as vector. From the species of tsetse flies *G. paladipes* is considered to be the main vector of the pathogenic trypanosome and biting flies such as *tabanides* and *musides* were also caught and these are considered very important for the possible mechanical transmission of disease. Based on the distribution of tsetse fly in the study area the control strategies has to be focused on strong sustainable and community based solution designed and implemented. Further epidemiological studies should be carried out and appropriate, feasible control of tsetse flies should be implemented.

References

1. Bangu B and Eyob E. The Distribution of Tsetse Flies Species and other Biting Flies in Mareka District of Dawuro Zone, Southern Ethiopia. Int. J. Adv. Res. Biol. Sci. 2017; 4: 10-14.
2. ILCA/ILRDA. Livestock production in tsetse affected areas of Africa preceding of a meeting of the African trypanotolerant livestock network, Nairobi, 1987. IUA/ILRDA. 1988: 473.
3. Holmes H and SJ Torr. The control of African trypanosomosis in African trypanosomosis current method and future trends. Oult Africa. 1988; 17: 54-60.
4. Leak SGA. Tsetse Biology and Ecology; their role in the epidemiology and control of trypanosomosis. CAB international Walling ford (UK). 1999.
5. Matovu E, Stewart ML, Gesiser F, Brun R, Seebeck T, de Koning HP. The mechanisms of arsenical and diamidine uptake and resistance in *Tryapanosoma brucei*. Euk Cell. 2003; 2: 1003-1008.
6. Langridge WP. Tsetse and trypanosomosis survey in Ethiopia. Ministry of overseas development, United Kingdom. 1976.
7. Moloo SK. The distribution of *Glossina* species and their natural hosts. Insect Sci. Applic. 1993; 14: 511-527.
8. Itard J. African animal trypanosomosis ni: Manual of tropical veterinary parasitology. English Edition CTA/CAB international. Walingford UK. 1989.
9. Hay SI, Tucker CJ, Rogers DJ and Packer MJ. Remotely sensed surrogates of meterological data for the study of distribution and abundance of arthrophode vectors of diseases. Annal Trop. Med. and Par. 1996; 90: 1-19.
10. Tikuber G, Gemechu T. Altitudinal distribution of tsetse in the fincha rift valley (western part of Ethiopia) inect Sci Appl. 1984; 5: 389-395.
11. Bright well R, Dranisfield RD and Yorku C. Development of a low cost tap and odor baits for *Glossina paladipes* and *G. longipenis*. Med vet. Entimo. In Kenya. 1991; 5: 153-164.
12. Leak SGA, Mulatu W, Authie E, d`letern peregrine A, Rowlands GJ, Trail J. Epidemiology of bovine trypanosomosis in the ghibe valley, south west Ethiopia. Acta Trop. 1993; 53: 134-150.
13. Walle R, Shearer D. Veterinary Entomology Arthrophod ecto parasite of veterinary importance Champman and Hall, London. 1997: 141-193.
14. Leak SK, Woume KA, Collaridoelle C, Duffera W, Feron A, Mulingo M, et al. Determination of tsetse challenge and its relationship with trypanosomosis in the Ghibe valley, south west Ethiopia. Acta Trop. 1987; 53: 121-134: 135-150.
15. Sheferaw D, Abebe R, Fekadu A, Kassaye S, Amenu K, Data D, et al. Prevalence of bovine trypanosomosis and vector density in a dry season in Gamo-Gofa and Dawuro Zones, Southern Ethiopia. Vet Parasitol Reg Stud Reports. Epub. 2019: PMID: 31796171.
16. Msangel S. Distribution, Density and infection rates of tsetse flies in selected sites southern rift valley of Ethiopia, Msc thesis. Addis Abeba university facility of veterinary medicen, Deber zeit, Ethiopia and Frie University at Berlin. 1993.
17. Gebisa G, Beriso K, Bogale B, Gizaw O, Chala D. Bovine Trypanosomosis and Its Vectors in Three Selected Districts of Buno Bedele Zone of Oromia Region, Ethiopia. Veterinary medicine international. 2020: 1571947.
18. Mohammed Ahemed MM and Dairri MF. Trypanosome infection rate of *G. paladipes* during wet season and dry season in Somali. Tropical Animal Health and production. 1987; 19: 11-20.