JOURNAL OF SCIENCE AND TECHNOLOGY RESEARCH

VOL. 3, NO. 3, 2004

An interdisciplinary approach to Science and Technology Research for development

INTERNATIONAL RESEARCH AND DEVELOPMENT INSTITUTE

JOURNAL OF SCIENCE AND TECHNOLOGY RESEARCH

ISSN 1596 – 9649

Volume 3, Number 3, 2004

EDITORIAL BOARD

Editor– in –Chief
DR. ANIEKAN OFFIONG
Department of Mechanical Engineering
University of Uyo, Akwa Ibom State, Nigeria.

Associate Editors

Dr. O. U. Oparaku
Department of Electronic Engineering
University of Nigeria.
Nsukka, Enugu State, Nigeria.

Dr. I. D. Mohammed
Department of Animal Science
University of Maiduguri
Maiduguri, Borno State, Nigeria

Dr. E. O. Ekundayo
Department of Soil Science
University of Benin
Benin City, Edo State, Nigeria

F. O. Aitsebaomo
Road Research Division
Nigerian Building and Road Research Institute
Ota, Ogun State, Nigeria.

Dr. B. A. Ezekoye
Department of Physics and Astronomy
University of Nigeria
Nsukka, Enugu State, Nigeria.

Dr. G. A. Ajibade
Department of Biological Sciences
Nigerian Defence Academy
Kaduna, Kaduna State, Nigeria.

Dr. E. E. Nnuka
Department of Mechanical Engineering
University of Agriculture
Makurdi, Benue State, Nigeria.

Dr. B. A. Ajala
Department of Botany
University of Jos
Jos, Plateau State, Nigeria.

Dr. O. A. Oke
Department of Biological Science
University of Agriculture
Abeokuta, Ogun State, Nigeria.

Dr. T. C. Uzomah
Department of Pure and Industrial Chemistry
Imo State University
Owerri, Imo State, Nigeria.

Dr. Eno Okoko
Department of Urban and Regional Planning
Federal University of Technology
Akure, Ondo State, Nigeria.

Dr. R. M. Sanni
Agricultural Economics and Extension Programme
Abubakar Tafewa Balewa University
Bauchi, Bauchi State, Nigeria.

Dr. O. O. Oyesiku
Department of Biological Science
Olabisi Onabanjo University
Ago-Iwoye, Ogun State, Nigeria.

Dr. D. S. Zibokere
Department of Agric and Environmental Engineeri
Niger Delta University, Wilberforce Island
Yenagoa, Bayelsa State, Nigeria.

JOURNAL OF SCIENCE AND TECHNOLOGY RESEARCH

ISSN 1596 – 9649

VOLUME 3, NUMBER 3, 2004.

Contents

			Pages
1.	Bacteria Associated with Dried Spoilt Cocoa (Theobroma Cocao).	Boboye, B. and Ajumobi, O.	1-3
2.	Fascioliasis: Post – Mortem Worm Count and Faucal Analysis in Cattle of Borno State, Nigeria.	Biu, A. A. and Babagana, M.	4-6
3.	Using Landsat Data Format for Baseline Hydrologic Mapping. A Case Study of Talata Mafara, Zamfara State, Nigeria.	D. O. Ejemeyovwi and O. D. Awaritefe	7-15
4.	Metabolic Effects of Bulchholzia Coriacea and Dietary Fibre on Diabetic Patients.	O. C. Ohaeri	16-19
5.	Location of Sales Outlets for Recovered Domestic Solid Wastes: Its Environmental Implication.	Okosun A. E.	20 -23
6.	Neural Network Method of System Identification.	Goshwe, N. Y. and Onah, C. O.	24-28
7.	Comparison of Forage Productivity, Carrying Capacity of Rangelands and Nutritional Value of Some Common Feedstuffs of Semi-arid Part of Yobe State, Nigeria.	Mohammed, I. D. and Abdullahi B. A.	29-32
8.	Seed Germination of Gambaya Albida (Linn) as Influenced by Different Nursery Techniques.	K. Okonomo; D.E. Dolor and B. E. Onyenue	33-38
9.	Effects of Three Sources of Nitrogen Fertilizers and Rates on the Performance of Two Varieties of Rice (Orza Sativa).	Egbuchua, C. N. and Bosah, B. O.	39-42
10.	β-Lactamase Production and Antibiotic Susceptibility Pattern of Bacteria Commonly Encountered in Medical Practice.	Uba A.	43-47
11.	Modeling Spreading Rate Force of Petroleum on Placid Aquatic Medium.	D. O. Njobuenwu	48-52
12.	The Estimation of Modified Non-Specific Solubility, Parameter from Physical Properties III: By Correlation with Boiling Point and Dielectric Constant of Liquids.	Tim C. Uzomah	53-59
13.	Malaria in Pregnancy: Serum Enzyme Level in Pregnant Malaria Patients in Lagos, Nigeria.	Raimi O. G.; Elemo, B. O. and Raheem, L.	60-63
14.	A New Protection Scheme for a Large Power System Network Using Wide Area Network (WAN).	Ndubisi Samuel N.	64-68
15.	Reduction of Trisoxalatocobaltate (III) Ion by Butane -1, 4-Diol.	Saratu M.; J. F. Iyun and G. F. S. Harrison	69-72
16.	Parkia Biglobosa a Promising Tree for Agroforestry in the Northern Guinea Savanna of Nigeria.	Abdulhameed, A.; Ezra, G. A. and Abdullahi, M. B.	73-75
17.	Distribution, Exploration and Evaluation of Industrial and Construction Minerals in Nigeria.	Gabriel Z. Ugwu and Chukwudi C. Eze.	76-80
18.	Effects of Aqueous Extract of Stem of Bark Of Cussonia (Arborea) Barteri (Aurev and Pellegr) on Experiential Trypanosome Congolense Infection in Rats: Preliminary Study.	Shamaki, B. U.; Iliyasu, B.; Abubakar A. and Onyekwelu, N. A.	81-85
19.	Process- Response in a Humid Tropic River, Benin City: Implications for Systems Dynamics.	Famous I. Aziegbe	86-94
20.	Multivariable Optimization by Coggin's Algorithm.	Bamigbola, O. M. and Agusto F. B.	95-98

Instruction to Authors
Subscription Rate

Journal of Science and Technology Research, Volume 3, Number 3, 2004
ISSN 1596 – 9649

EFFECTS OF AQUEOUS EXTRACT OF STEM OF BARK OF CUSSONIA (ARBOREA) BARTERI (AUREV AND PELLEGR) ON EXPERIMENTAL TRYPANOSOMA CONGOLENSE INFECTION IN RATS: PRELIMINARY STUDY.

[1]Shamaki, B. U; [2]Iliyasu, B.; [2]Abubakar, A.; [2]Onyekwelu, N. A.;
[1]Omotainse, S. O.; [2]Ojiegbu, F. N. C.; [2]Bot D. Y. ; and [1]Ajagbona, V. N.
[1]Veterinary and Livestock Studies Division; [2]Biochemistry and Chemotherapy Division
Nigeria Institute for Trypanosomiasis Research, Vom. Plateau State, Nigeria.

ABSTRACT

The aqueous stem bark extract of cussonia barteri used locally in the management of animal trypanomiasis was evaluated for anti trypanosomal activity prophylactically using rates. In the therapeutic study, a dose of 200 mg/kg body weight was orally administered with the establishment of infection for 5 successive days. For prophylactic studies, the extract was administered for 5 successive day's before inoculation with 1 x 10^6mlof trypanosome congolense. The acute toxicity of the extract gave the LD_{50} value of 2,500mg/kg. b. wt. infection of rats with T. congolense was established 6 – 11 days post inoculation in both investigations. The infection was characterized by persistent parasitaemia, anaemia and leucopenia. Both studies did not result in significant increase (P,0.05) was recorded in mean cell volume (M.C.V.%) at day 3 post treatment, and days 6, 11 and 14 post prophylaxis. Although this plant is claimed to have been in use for the management of Trypanosomosis. There was no significant difference in the level of parasitaemia and survival period between prophylactic and therapeutic trials when compared to untreated controls (P.0.05). Further trials in combination with other trypanosomal agents is recommended to evaluate possible synergistic property.

Keywords: Cussonia (arborea) bateri, T. congolense, pprophylaxix and treatment.

INTRODUCTION

Animal trypanosomaisis is a diseases complex caused by different species of the haemoprotozoan parasite Trypanosomes. The disease is unique to Africa affecting both humans and domestic animals (Brian 2001). It affects cattle and small ruminants in many states of Nigeria where the causative organisms are mainly I. congolense and or T. vivax. The impact of the disease on livestock production and land use is devastating. This is because vast areas of land/pasture are rendered unsuitable for grazing due to the presence of parasites and their vectors (Swallow 200). This affects the economic and nutritional status of most rural dwellers in endemic zones (Swallow 2000). Successfully treatment of animal trypanosomasis by the few available drugs is et al, 1996). This problem of resistant to almost all the drugs (Franziska et al, 1996). This problem of resistance is although to be due to inappropriate use drugs that are expensive and not readily available (Ilemobade et al, 1975). There has been oral claims about the use of the plants alone or in combinations by herdsmen to treat their Trypanosoma infected animals. Cussonia baeteri (Aurev and Pellegr) is a tropical plant reportedly used by Fulani herdsmen and other traditional healers to treat a variety of diseases that include leprosy, constipation and feverish conditions (Burkill 1985 and Keay et al, 1958). Another species of this plant C. bancoensis has been shown to possess smooth muscle relaxant property hence its use anti-spasmodic (Haruna, et al, 1996). In addition, the Fulani herdsmen claim to use it in the treatment of Sammore (Trypanosoma infection) by boiling the bark and administering the filterate orally to the infected animals. Soaps and blue dyes have been made from parts of this plant. (Dalziel 1955, Unwin 1966 and Hutchison et al, 1958). The pant is rich in saponins and flavonoids (Haruna et al, 1996). A clear gum exudates produced by this pants is found to contain alkaloids (Burkill, 1985). This work is aimed at investigating the trypanocidal potential of this plant in experimental T. congolence infections of rats.

MATERIALS AND METHOD

Plant Material Collection and Extraction: The fresh stem bark was collection from Kaltungo (Gombe State, Nigeria) in the month of March and transported to Vom, Plateau State in a clean perforated bag. This was allowed to dry at room temperature. The plant leaves flower's and bark was authenticated by Mal. Garba Mohammad of Dept of Biological Science A.B.U. Zaria. The dried stem bark extract was reduced to a coarse powder. 200g of this powder was boiled in distilled water for 2 hours. The extraction was allowed to continue for 24 hours after which it was filtered using clean muslin cloth; and filter paper. The residue was dried, and re-extracted using same procedure. The filterate was dried using oven set at 45^0c for 4 days.

for 24 hours after which it was filtered using clean muslin cloth; and filter paper. The residue was dried, and re-extracted using same procedure. The filterate was dried using oven set at 45°c for 4 days.

ACUTE TOXICITY TEST

The lethal dose LD_{50} of aq. Extract of cussonia barteri was determined using swiss mice by oral route as described by Lorkes (1983).

PHYTOCHEMICAL ANALYSIS

The aqeous extract of cussonia bateri (stem back) was analysed for the presence of tannins, phlebotamins, cardic glycosides, anthraquinone, alkonoids, saponins, reducing sugar and flavanoids using standard procedure (Treaseand Evans 1983).

PROPHYLACTIC STUDIES

Twelve albino rats obtained from Vet. and Livestock studies division of Nigerian Institute for Trypanosomiasis Research (NITR) Vom was used. These were divided into 4 groups of 3 rats each. They were weighed and allowed to acclimatized in the laboratory for 5 days. Animals I group 1, 2, and 3 were dosed with hot aq. Extract of Cussonia bateri (stem bark) at 200mg/kg. Body weight for 5 successive days while group 4 served as untreated infected control. Blood samples form the rats were collected for packed cell volume (PCV%) Red blood cells (RBC) counts ($x10^6$/ml) and white blood cell (WBC x 10^6/ml) determination at pre-treatment, treatment and subsequently twice a week until establishment of infection.

THERAPEUTIC STUDIES

Fifteen albino rats (charles Winstar)obtained from the parasitology section of N.I.T.R. Vom were divided into 4 groups pf 3 rats each and allowed to acclimatized for 7 days. The rats were weighted. Rats in group 1 – 4 were each inoculated with 1 x 10^6 Trypanosoma congolense (Karu Strain) intraperitoneally in 0.2ml normal saline Group 5 served as uninfected but treated control. Parasitaemia was monitored daily by wet film examination. At the onset of infection, treatment with aq. Extract of cussonia bateri (stem bark) commence daily at a dose of 2000mg/kg. b. wt.

RESULT

Phytochemical study: Phytochemical Screening of the aq. Extract of cussonia bateri reveals the presence of reducing sugar, alkaloids, saponnins (frothing), cardiac glycosides and Tannins as the chief principles.

ACUTE TOXICITY TEST

The LD50 of cussonia barteri (aq.extract) is 2,5000mg/kg. b. wt. and is therefore slightly toxic to mice. However, at this dose mouth scratching and slight nervous sign was observed, this may be due to across synapse (brander and Pugh 1977).

PROPHYLACTIC AND THERAPEUTIC STUDY

Result from the two studies are shown in graphs 1a, b and c for prophylactic studies and 1a, b and c for therapeutic studies respectively, 2d represents the mean corpuscular volume (MCV%) while table 1 is the Survival periods of the animals.

DISCUSSION

For the purpose of evaluating the active of the plants aq. Extract, anaemia, which is there cardic sign of Trypanosomiasis is focused. PCV (%) RBC (x 10^6/ml), and WBC ($x10^6$ml) and MCV (%) were evaluated in both prophylactic and therapeutic studies before and after oral administration of aq. Extract at 2000mg/kg. b. wt. figure 1a, b and c indicates prophylactic studies. The PCV% (1a) in treated as compared with treated uninfected and untreated uninfected control do not appreciate indicating continuous red blood cell destruction by the infecting T. congolense infected. The is same in fig. 1b.where the RBC drops in volume in circulation. However in fig. 1c the WBC appreciate at day 3 – 11. This is evidenced by rise in WBC in circulating blood in both treated and infected untreated rats, this is in response to initial infection, it usually indicate possible synergistic prosperity of the aq. Extract. This appreciation of circulating W.B.C. is shortlived, though the animal eventually lasted for 16 days post treatment (Table 1) its of no statistically significance $P > 0.05$).

Fig. 2a, band c represents therapeutic studies result. There was observed a drop in R.B.C. x 10^6/ml form day 0 -3 possibly due hydrocyanic acid [11] from hydrolysis of glycosides (Brander and Pugh, 1977) post treatment and after and after establishment of infection. The rise appreciate significantly) P<0.05) at day 3, 11 and 14 respectively corresponding to a to period of high WBC actively fig. 2c,a and equally a drop in parasiaemia, with, perhaps increase tonic activity of the heart muscles due to cardic glycosides action. (Brander & Pugh 1977)[11]. The PCV(%) fig. 2b. shows little, (day 11 – 14 or no appreciation while WBC x10^6ml equally appreciate at day 3, 11 and 14 respectively. This appreciation is dramatically reduced at day 14 Fig. 2c indicating increaser T. congolense activity and reduced WBC and possibly extract activity. The average survival period of this study is 25 days (20 – 35 days range) prepatent period (ppp) is generally between 5 – 12 days in both studies (table 1).The significant increase in MCV (%) seen at day 6, 11 and 14 post treatment could be associated with increase in immature red blood cells in circulation due to compensatory bone marrow regeneration as a result of progressive anemia which is a recognized feature in Trypanosomiasis.

CONCLUSION

The possible synergistic and potentiating property of this extract is worth evaluating. The ability of the extract to stimulate production of antibodies is another area that needs further study.

ACKNOWLEDGMENT

We appreciate the effort of lab. Technician in VLS division and chemotherapy and Biochemistry division both, of N.I.T.R., Vom for assisting in this work. We equally appreciate the effort of D.G.N.I.T.R., Dr. I Halid for permitting this work to be published.

REFERENCES

Brander, G. C., and Pugh, D. M. (1977): Veterinary applied pharmacology and therapeutics. Textbook 3rd ed Pg. 7, 45 and 75.

Brian, S. Hursey (2001): Trends in parasitology. The programme against African Trypanosomiasis.

Burkill, H. M., (1985): The useful plant of West Tropical Africa 2nd edition, Vol. 1 Royal botanical gardens. Kew.

Dalzie, J. M. (1955): Useful plant of West tropical Africa pg. 346.

Franziska, F. et al, (1996): In vitro anti-trypanosomal activity of African Plant used in traditional medicine in Uganda to treat sleeping sickness. Tropical medicine and International health. Vol. 1 No. 6 page 765 – 771.

Haruna et al, (1996): Short communication.

Hutchison, J. Dalzie, J.M., Keay, R.W.J. (1958): Flora of West Tropical Africa Pg. 750. and 2nd ed. Vol. 1 pg. 110.

Ilemobade, A. A., Leeflang P., Buys, J. and Blotkamp J. (1975): Studies on isolation and drug sensitivity of Trypanosoma vivax in Northern Nigeria. Ann. Trop. Med. Parasit. 69. 13 – 15.

Keay, R. W. J., Onochie, C. F. A., and Star Field, D.P, (1958): Nigerian Trees. Pg. 327.

Lorke, D. (1983): A new approach to practical toxicity testing. Arch. Toxicol. Vol. 54, pg. 275 – 287.

Swallow B. M. (2000): Impact of trypanosomiasis on African Agriculture. In PAAT technical and scientific series 2. Pg; 26.

Trease, G. E. and Evans, W.C. (1983): In text book of pharmacognsy. 12th ed Balliere Tindall, London pg. 275 – 287.

Unwin, H. (1966): West African Forest and Forestry.

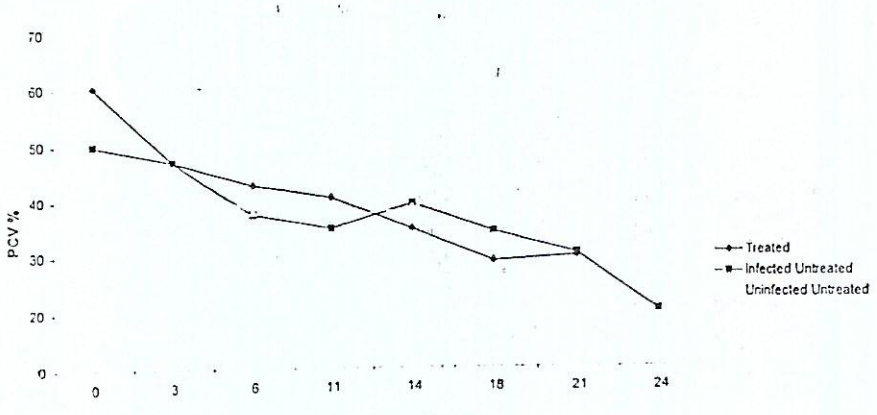

Fig. 1a: Prophylactic Property of Cussonia barteri on mean PVC % of T congolense infected mice.

ISSN 1596 – 9649

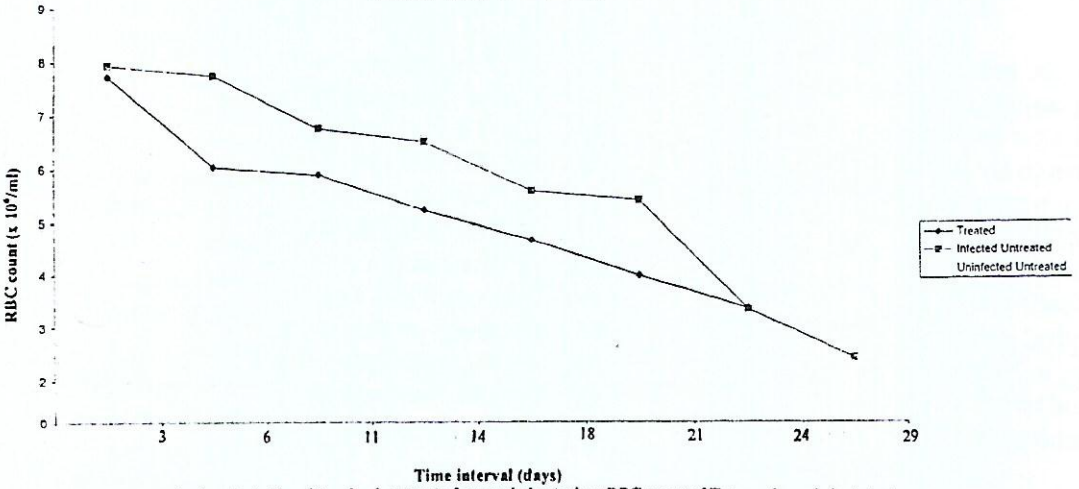

Fig. 1b: prophylactic effect of aq. Stem bark extract of cussonia barteri on RBC count of T. congolense-infected mice.

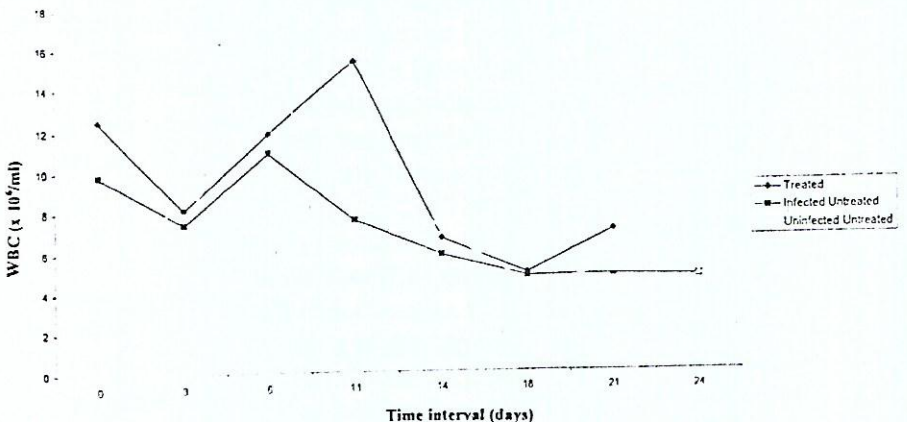

Fig. 1c: prophylactic property of aq. Stem bark extract of cussonia barteri on mean WBC (X10⁶/ml) T. congolense - infected mice.

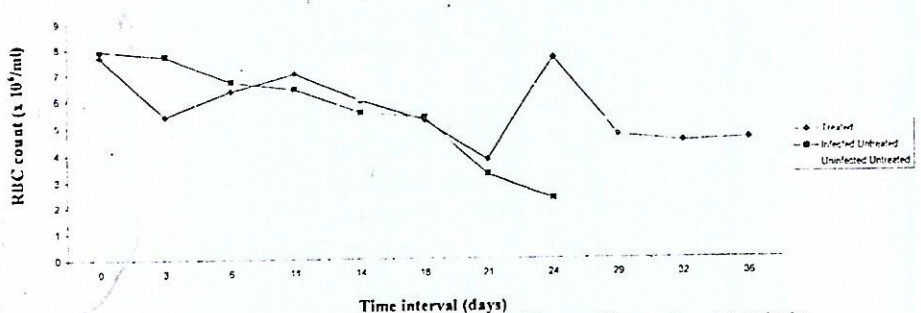

Fig. 2a: Effect of aq. Stem bark extract of cussonia barteri on RBC count of T. congolense-infected mice.

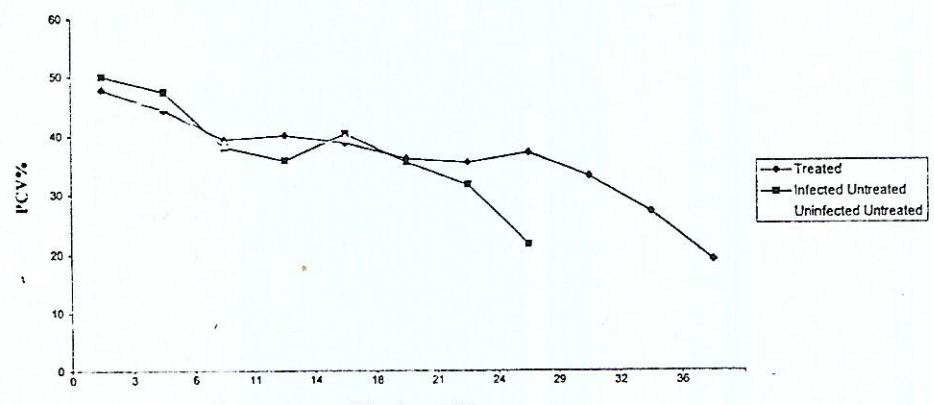

Fig. 2b: Effect of aq. Stem bark extract of cussonia barteri on PCV (%) of T. mice – infected with T. congolense

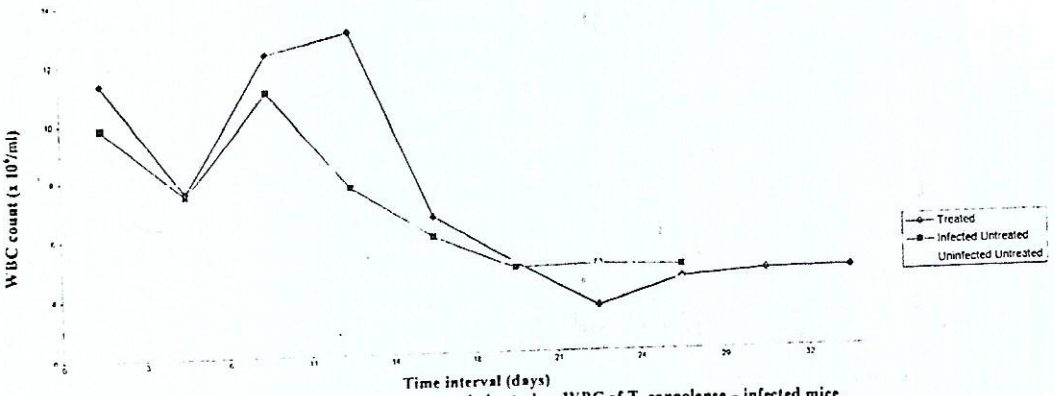

Fig. 2c: Effect of aq. Stem bark extract of cussonia barteri on WBC of T. congolense – infected mice.

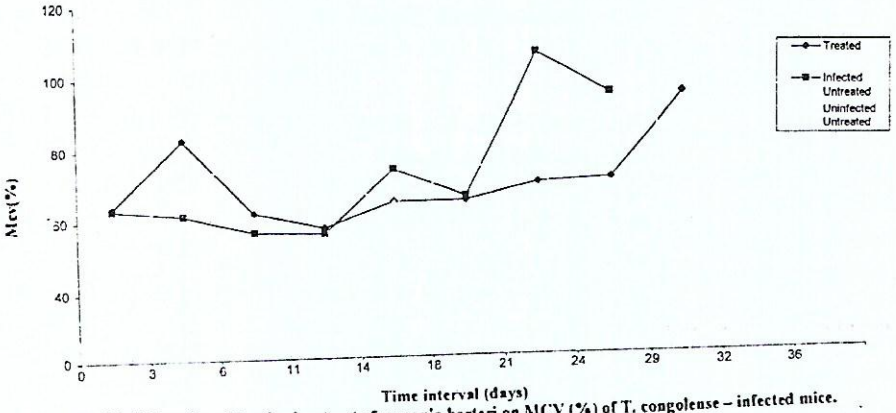

Fig. 2d: Effect of aq. Stem bark extract of cussonia barteri on MCV (%) of T. congolense – infected mice.

Table 1: A table showing survival period of Animals subjected to various Treatments.

Treatment	Dose	Cage No	Animals /No cage A signets	Prepatent period (pp) (days)	Average ppp (days)	Survival period (onset of inf. Ro death)	Ave. survival period	Total No of days
Prophylaxis	150mg/kg	1	1 7 17	6 9 9	8	13 13 4	19 22 13	10
	2000mg/kg	2	2 5 6	6 4 5	5	10 11 3	16 15 8	8
	2500mg/kg	3	13 16 18	7 6 6	6	5 9 3	12 15 9	6
Curative	1500mg/kg	4	3 14 15	12 8 6	9	15 19 20	27 27 26	18
	2000mg/kg	5	4 10 12	11 7 8	9	9 13 27	20 20 35	16
	2500mg/kg	6	C1 C2 C9	7 8 8 (6 – 12)	7	12 21 11 (9 – 27)	19 29 19(19-35)	15
Control	7 infected untreated	19 20 21	14 10 13	12	9 13 4(2 – 13)	9 13 4 (2 – 13)	23 23 17(17-23)	8
		8	Uninfected	Untreated.				