

## *In vivo* Anti-trypanosomal activity of aqueous extract of *Ipomea batatas* leaves

Zainab Aliyu Alhafiz<sup>1,3\*</sup>, Musa Bashir<sup>2</sup>, Aminu Raphael<sup>3</sup>, Musa Ismail<sup>1</sup> and Mohammed Auwal Ibrahim<sup>3</sup>

<sup>1</sup>Department of Biochemistry, Faculty of Science, Federal University Gusau, Zamfara State,

<sup>2</sup>Centre for Dryland Agriculture, Bayero University, Kano.

<sup>3</sup>Department of Biochemistry, Faculty of Life Sciences, Ahmadu Bello University Zaria

\*Corresponding Author. Email & Phone No.: [zainabalfiz80@gmail.com](mailto:zainabalfiz80@gmail.com). Tel. +2348032846276

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### ABSTRACT

The potential of an aqueous extract of *Ipomea batatas* leaves to exhibit anti-trypanosomal action *in vivo* was studied. Rats infected with  $10^4$  *Trypanosoma brucei brucei*/ml were treated experimentally with extract at doses of 100 and 200 mg/kg body weight beginning on day 5 after infection. At the end of the study period, on day ten post-infection, the treated rats showed little parasitaemia. The extract exhibited inhibitory activity of 89.29 and 95.53% at 100 mg/kg and 200 mg/kg body weight respectively. The study findings indicate that leaf extract has dose-dependent anti-trypanosomal efficacy.

**Keywords:** Anti-trypanosomal activity, percentage inhibition, *Trypanosoma brucei brucei*, *Ipomea batatas*

### 1.0 INTRODUCTION

Sub-Saharan Africa is home to cattle afflicted with African animal trypanosomiasis (AAT), this disease is characterised by increased unhealthiness, anaemia, wasting, and, if untreated can result to death of the host (Okello *et al.*, 2022).

*Trypanosoma vivax*, *Trypanosoma congolense*, and *Trypanosoma brucei brucei*, members of the kinetoplastid family (a reservoir for human infective species), are the primary cause of disease-related deaths in sheep and goats and cause an annual economic loss of about US \$578 million to the agricultural industry in Nigeria as a result of inefficient livestock farming (Odeniran *et al.*, 2021).

The majority of drugs used to treat AAT have limitations in that they cannot cross the blood–brain barrier, which causes infection to recur in the bloodstream after treatment. These drawbacks add to the existing therapies' inadequacies, toxicity, expense, and emergence of drug-resistant strains (Kasozi *et al.*, 2022; Venturelli *et al.*, 2022). The need for a more affordable, safer, more effective, and more bearable therapy option is urgent due to these shortcomings. This is due to the fact that plants have been utilized to create medications with excellent pharmacological qualities that work well both *in vitro* and *in vivo*. Furthermore, because pharmaceutical drugs are so expensive and difficult to obtain, it is estimated that 70% of the world's population relies on plants to treat their illnesses (Mintah *et al.*, 2019; Khan and Ahmad 2019; Wing-Fu Lai, 2019).

Sweet potatoes, or *Ipomoea batatas* [L.] Lam, are a major food crop in the world. They are a member of the family

Convolvulaceae and genus *Ipomoea*. A wide range of bioactive compounds in the plant make it suitable for use as a traditional remedy in many cultures around the world, and therefore they may have potential therapeutic ability along with related health benefits. These compounds exhibit various bioactivities that are responsible for activities such as immune modulation, hepato-protection, antimicrobial (Kang and Sung-Gyu Lee, 2021) antioxidant (Zhang *et al.*, 2019), anti-mutagenic (Akram *et al.*, 2020), and hepato-protection (Suhendy *et al.*, 2023). Furthermore, they have shown a great deal of promise in the treatment and prevention of long-term illnesses like diabetes, cancer, heart disease, and neurological problems. This plant is used to treat hepatomegaly, inflammation, and parasite infections, although its anti-trypanosomal properties have not been well investigated. Thus, the purpose of this study was to assess the *Ipomea batatas* aqueous leaf extract's *in vivo* anti-trypanosomal activity.

### 2.0 MATERIALS AND METHODS

#### 2.1 Plant Collection and Preparation

Fresh leaves of *Ipomea batatas* (Mother delight) cultivars were harvested from the training farm of The Centre for Dryland Agriculture, Bayero University Kano. The samples were identified and authenticated at the herbarium unit, where a reference number (Umuspo 2) was deposited. The plant leaves were air dried at room temperature and kept in air-tight polythene bags. Dried leaves were pulverized into powder and about 34g dissolved in 162.3ml of water. This was shaken occasionally and allowed to stand for 72 h at room temperature. The extract was sieved with Whatmann filter paper No. 1 and then evaporated to dryness using a water bath at 40°C.

## 2.2 Trypanosome parasites and experimental animals

The Federe strain of *Trypanosoma brucei brucei* was collected from Ahmadu Bello University Zaria, Kaduna State, through the Department of Veterinary Parasitology and Entomology within the Faculty of Veterinary Medicine. Approximately  $2.0 \times 10^6$  parasites/ml were intraperitoneally injected into albino rats from the blood of an infected donor rat.

Adult albino rats weighing between 240-260g were sourced from Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, Ahmadu Bello University Zaria, Kaduna state, kept in cages and the animal laboratory care of CCAC (1993) was strictly followed. They were fed standard rat pellets and clean water ad libitum and allowed to acclimatize for a period of two weeks prior to initiation of experiment.

## 2.3 In vivo study of anti-trypanosomal activity of Ipomea batatas extracts

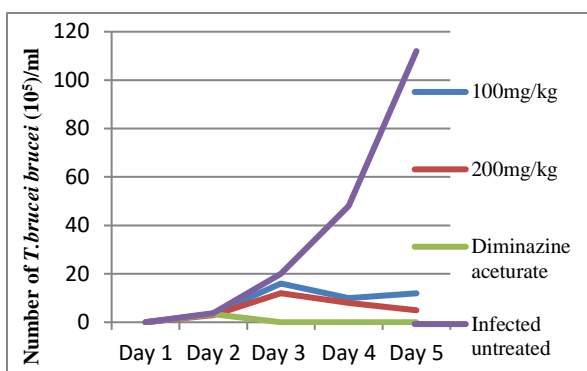
Twenty-five albino rats of both sexes were chosen at random and placed into groups (I–V), each with five rats.  $1 \times 10^5$  parasite /ml *T. brucei brucei* organisms were intraperitoneally injected into each of the five groups of rats. Groups I and II received the extract at daily doses of 100 and 200 mg/kg, respectively, on the fourth day after infection. Group III received a single dose of diminazine aceturate at a dose of 3.5 mg/kg body weight. Group IV served as a normal control, while Group V served as infected but untreated control. Wet film smears of the contaminated blood were used to measure parasitemia for five consecutive days, and parasites were counted under a microscope in accordance with (Marselaet *et al.*, 2020).

## 2.4 Statistical analysis

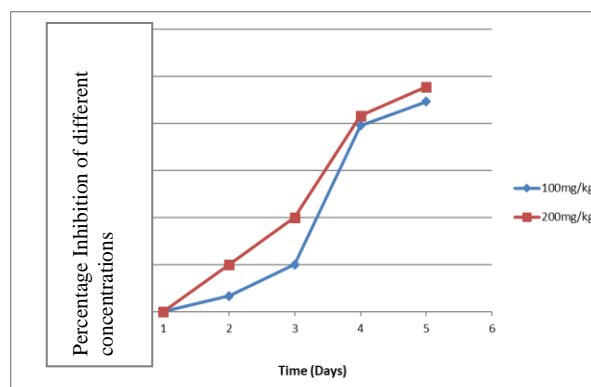
Every experiment was run in three replicates. The data were subjected to one way analysis of variance (ANOVA) and were presented. Values were deemed statistically different when  $P < 0.05$ .

## 3.0 RESULTS AND DISCUSSION

From Fig. 1, the results for the *in vivo* anti-trypanosomal activity of different concentrations of *Ipomea batatas* leaves showed 95.53% inhibition at concentration of 200mg/kg while 100 mg/kg was found to have 89.29% inhibition after 5 days of treatment. The standard drug, diminazine aceturate showed complete inhibition at a concentration of 3.5mg/kg.



**Fig. 1 In Vitro Effect Of Different Concentrations Of Aqueous Extract Of I.batatas Leaves On Percentage Inhibition Of T.brucei brucei**



**Fig. 2: Parasitemia Profile of Trypanosoma brucei brucei Infected Rats Treated With Two Different Dosages Of I. batatas For 5 days**

## 4.0 DISCUSSION

Earlier reports on *Ipomea batatas* leaves indicate that its health benefits are related to high levels of bioactive compounds such as polyphenols, flavonoids, and carotenoids (Gabilondo *et al.*, 2022;Jeng *et al.*, 2015; Nguyen *et al.*, 2021; Amagloh *et al.*, 2022). It is interesting to note that in the realm of literature, there exists no documented information pertaining to the plant's anti-trypanosomal activity. This study is the first attempt to investigate the *in vivo* anti-trypanosomal activity of *I. batatas* leaves. The high percentage inhibition observed by the extract of this leaves might be due to the presence of the aforementioned bioactive compounds which have been implicated in inhibition of the growth and survival of trypanosomes, possessing antioxidant properties that can assist in countering the oxidative stress caused by trypanosome infections, distortion of integrity and function of cell membranes in trypanosomes, disruption of cellular processes, as well as

enhancing the host's immune system's ability to fight off the trypanosome infection.

## 6.0 CONCLUSION

This study suggests that the leaves of *I. batatas* possess powerful anti *T. b. brucei* properties, showing almost complete cessation of trypanosomal motility after treatment.

However, further studies will investigate the in vitro anti-trypanosomal activity of the plant as well as carry out a detailed bioactivity-guided fractionation to identify, isolate, and purify biologically active compounds.

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