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# Pharmacognostic Investigation and Mineral Analysis of Dried Powdered Young Leaves of Traditional Medicinal Plant *Mezoneurum benthamianum* Used for the Treatment of Heartburns/Pyrosis in Sierra Leone

Lahai Koroma*[1, 2], T. B. R. Yormah[2], L. M. Kamara[2], G. M. T. Robert[3]
[1]Department of Basic and Environmental Sciences, Eastern Polytechnic, Kenema, Sierra Leone
[2]Department of Chemistry, Fourah Bay College, University of Sierra Leone, Sierra Leone
[3]Department of Chemistry, Njala University, Njala, Bo District, Sierra Leone
[1]Corresponding author: E-mail: lahaikoroma2001@gmail.com

***Abstract***—*Pharmacognostic investigation involving organoleptic evaluation, fluorescent analysis, phytochemical screening and mineral analysis of the dried powdered Leaves of Mezoneurum benthamianum plant used for the treatment of heartburns/pyrosis in Sierra Leone has been carried out. The results indicate that the dried fine powdered leaves of Mezoneurum benthamianum plant was light green in colour, spicy odour and slightly bitter, gave fluorescent derivatives with the reagents 1M NaOH (aq), 1M NaOH(alc.), Ammonia, 50% HCl, and 50% $HNO_3$ which is one of the parameters for pharmacognostic evaluation of crude drugs in traditional medicinal plants and contained the following secondary plant metabolites; carbohydrates, alkaloid, flavonoids, proteins, sterols/terpenes, tannins and saponins.*

*Elemental analysis of plant organ investigated was performed with a Niton XL3t GOLDD + Hand held X-ray Fluorescence (Thermo Fisher) and the results indicated that the plant organ investigated contained large amounts of nutrients and was rich in K (31249 ± 180.00 ppm), Ca (19394 ± 188.00 ppm), Mg (8086 ± 1470 ppm), Al (2536 ± 220.00 ppm) and Fe (1101.80 ± 17.60 ppm). The other elements present in smaller quantities were Ti (253 ± 16.00ppm), Mn (235.77 ± 14.27 ppm), Sc (102 ± 16.00ppm), Zn (86.24 ± 2.91ppm), Sr (66.99 ± 0.91ppm), Zr (49.89 ± 0.92ppm), Rb (41.32 ± 1.00 ppm), Cu (19.36 ± 4.30ppm) and Mo (6.01 ± 0.77ppm).*

*Ethno medical information of Mezoneurum benthamianum plant indicated that the plant is widely used across West Africa for the treatment of piles and ulcers, as depurative and mildly laxative, cure colic, laxatives and stomach troubles all of which are symptomatic of heartburns/pyrosis in traditional medicine. The presence of the above secondary plant metabolites and the concentration of Zn (86.24 ± 2.91ppm) being much higher than Cu (19.36 ± 4.30ppm) in the dried powdered Leaves of Mezoneurum benthamianum plant support the use of the plant in traditional medicine and as a food supplement.*

***Keywords***— *Pharmacognostic, fluorescent analysis, phytochemical, mineral analysis and heartburns/pyrosis.*

## I. INTRODUCTION

This research work is geared towards the Pharmacognostic investigation and mineral analysis of dried powdered leaves of traditional medicinal plant *Mezoneurum benthamianum* used for the treatment of heartburns/pyrosis in Sierra Leone. Heartburns/pyrosis as it is called in Sierra Leone Mende culture, can be described as a painful burning sensation in the chest caused by gastro-esophageal reflux (back flow from the stomach irritating the esophagus); symptomatic of an ulcer or a diaphragmatic hernia or disorder. The Hot decoction of powdered dried young leaves is drunk twice a day as a remedy/treatment of heartburn/pyrosis.

*Local vernacular names in Sierra Leone*

Mende: kPinDi- YALI
Temne: Am-BANDɔBRUP
Kono: BOGɛ-SALOɛ
Kissi: gBUWE
Loko: LAPEɛLA

Mezoneurum benthamianum is a climbing or straggling shrub that grows up to 20 meters long and 8cm in diameter [1-3]. The stems have re-curved spines and harvested from the wild for local use, mainly medicinal. The plant is edible, a source of drinking water from the cut stem and the leaves chewed for mastication [3]. The plant is sometimes planted on hedges to make them impenetrable and grows widely in humid and rural localities in dry deciduous woodland and savannah and on roadsides in West tropical Africa ranging from Senegal to Gabon.

It has been reported that an infusion of the dried roots is drunk or used as a bath against general malaise, drunk to cure dysentery, when mixed with palm wine it increases the strength or has aphrodisiac properties and used to cure urethral discharge. The stems and roots are used for dental hygiene, to sooth toothache and as an aphrodisiac.

Antimicrobial activity on a range of organisms using the petroleum ether, chloroform and ethanol extracts of the roots of *M. benthamianum* has been reported. The leaves of the *M. benthamianum* plant are used as depurative and mildly laxative, cure colic and are eaten as a treatment for hookworm or Guinea worm, and a macerate of leafy twigs is given to people suffering from impotence related to venereal diseases [3]. The leaves are also applied externally as a paste to treat snakebites, treatment of wounds, skin infections, piles and *ulcers*. The stem liquid is dropped in the eye to cure inflammation and cataract [3].

In Guinea, the leaves of *Mezoneuron benthamianum* are traditionally used to treat malaria [4] and possessed good



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antiplasmodial activity during antiprotozoal in vitro screening [5].

Three di-terpenes, two flavonoids, resveratrol, gallic acid and its ethyl ester, Î²-sitosterol glucoside and pheophorbide derivatives have been isolated from the leaves of *M. benthamianum* [6]. In Nigeria the plant is reported to provide cure for refractory sore, pulmonary inflammation, treatment of dermal infection, blood disorders, *laxatives, stomach troubles*, venereal diseases, eye treatments, genital stimulants/depressants, hemorrhoids, pain-killers, pulmonary troubles and as chewing stick [3-6]. Anti-diarrhoeal activity [7,8] Antimicrobial, Resistance-Modifying Effects, Antioxidant and Free Radical Scavenging Activities [9] and gallic acid Derivatives [10] of the aqueous extract of *Mezoneuron benthamianum* has been reported.

Trace elements are essential components of biological structures that mediate vital effect on and play a key role in a variety of the biochemical processes necessary for life. The level of these trace elements in traditional medicinal plants need to be investigated since excessive levels higher than that needed for biological functions of these elements can be toxic for the body health. Hence any pharmacognostic investigation must be followed by mineral analysis.

## II. Materials and Methods

*Collection and preparation of dried plant materials*

Fresh Young Leaves of *Mezoneurum benthamianum* were harvested from the Gola Forest and sun-dried for 4-7 days. The Young leaves were dried using a protective cloth and not on the ground to minimize any microbial contamination. After drying, the young leaves reduced in size by crushing it into smaller pieces using the hand, grounded using a laboratory mill and kept in a proper container until the time of the extraction. The plants organ investigated is the young Leaves of *Mezoneurum benthamianum*. The image of the plant is as shown in Figure 1.

FIGURE 1: Photo of *Mezoneurum benthamianum*

A *Voucher Specimen No. 403* of *Mezoneurum benthamianum* was deposited in the Herbarium of the Botany Department, Fourah Bay College (University of Sierra Leone). The plant material was used to carry out the following analyses described below:

Organoleptic evaluation
Fluorescence analysis
Phytochemical screening
Mineral analysis

*Experimental*

*Organoleptic characters*

Organoleptic evaluation was carried out by means of sense organs, which provide the simplest and purity means to ensure quality of a particular drug. Organoleptic characters investigated [11] are size, colour, odour, taste and texture of the dried powdered leaves of *Mezoneurum benthamianum*. The results are shown in Table 1 with image of the dried powdered leaves of *Mezoneurum benthamianum* shown in figure 2 below.

Fluorescence analysis

10 mg of dried powdered Leaves of *Mezoneurum benthamianum* was placed in each of twelve (12) petri dishes free from grease and 2-3 drops of freshly prepared reagent solution added, mixed by gentle with a glass rod and waited for few minutes. The following freshly prepared reagents used are; 1 N NaOH (aq), 1 N NaOH (alc.), Ammonia, Picric acid, Petroleum ether, 50% HCl, 50% $H_2SO_4$, 50% $HNO_3$, Ethyl acetate, Ethanol, Methanol, and Bromine water.

The colours of each of the contents in Petri dish were observed in visible light, short (254 nm) and long (365 nm) ultra violet radiations using a U/V Lamp. The colours observed with the application above reagents in the different radiations are [12] shown in Table 2.

Phytochemical analysis

Soxhlet extraction was carried out on the dried powdered Leaves of *Mezoneurum benthamianum* using solvents of increasing polarity (i.e. Petroleum ether [60-80 $^{o}$ C], Acetone, Chloroform Methanol, 95% Ethanol and Water. Each of the solvent extracts was concentrated, reduced to a semisolid mass using a Rotary Evaporator at 50$^{o}$C and kept in special containers for phytochemical screening.

The Phytochemical screening involved testing each of the Solvent Extracts for the various classes of secondary plant metabolites. The methods used for detection of various phytochemicals were followed by qualitative chemical test and by standard procedures [13, 14] to give general idea regarding the nature of constituents present in each of the solvent extracts of the plant part investigated [15-22]. They are generally tested for the presence of secondary plant metabolites such as Carbohydrates, reducing sugar, starch, saponins, proteins, Sterols/triterpenes, tannins, alkaloids and flavonoids.

*Test for Carbohydrates, reducing sugar and starch.*

500 mg of each of the Solvent Extract was dissolved in 50 ml distilled water and filtered. The filtrates were subjected to the following tests to detect the presence of carbohydrates, reducing sugar and starch.

*Teat for Carbohydrates*

The *Molisch's test* was used to test for carbohydrates

During the test 5 ml of each of the extract filtrate was treated with 3 drops of alcoholic α-naphthol solution in a test tube and 3 ml of concentrated tetraoxosulphate (VI) acid added carefully down the sides of the test tubes. The formations of violet/purple ring at the junction between the two liquids indicate the presence of carbohydrates.

*Test for reducing sugars:*



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The Fehling reagent was used to test for reducing sugar. During the experimental work 5ml of each of the **e**xtract filtrate was treated in equal volumes with 2ml Fehling A and 2ml Fehling B solutions, boiled for one minute and then boiled for 5-10 minutes on water bath. The formation of reddish brown precipitate indicates the presence of reducing sugar.

*Iodine Test:*

2-3 drops of iodine solution was added to 5 ml of each of the extract filtrates and observed.

The formation blue-black colour indicates the presence of starch.

*Test for Saponin:*

*Froth test:* - Each of the Extract filtrates was treated with water in a tube shaken vigorously. The appearances of a persistent froth on the top of the extract filtrates indicate the presence of saponins.

*Test for Proteins:*

The Biuret test is the general test used to detect the presence of proteins. During the test 5 ml each of the Extract filtrates was treated with 2 ml 10% sodium hydroxide solution and heated. 3-5 drops of 0.7% copper (II) tetraoxosulphate (VI) solution was added to the mixture, stirred and allowed to stand for few minutes. The formation of purplish violet colour may indicate the presence of proteins.

*Test for Sterols and Triterpenoids:*

*Libermann-Burchard test*

During the test each of the Extract filtrate was treated with 5-6 drops of acetic anhydride and boiled for few minutes. The mixture was cooled and concentrated tetraoxosulphate (VI) acid added down the side of the test tubes. A brown ring at the junction of two layers with the upper layer turning green indicates the presence of sterols while formation of deep red colour indicates the presence of triterpenoids.

*Salkowski's test*

During the test each of the Extract filtrate was treated with 3 ml of chloroform and few drops of concentrated tetraoxosulphate (VI) acid, shaken well and allowed to stand for some time. The appearance of red colour in the lower layer indicates the presence of sterols while formation of yellow coloured lower layer indicates the presence of triterpenoids.

*Tests for tannins:*

*Ferric chloride test*

5 ml of each of the Extract filtrate was shaken with water and warmed. 2 ml of 5% Iron III chloride solution was added and observed. The formation of green or blue colour indicates the presence of tannins

*Gelatin test*

3ml of 1% gelatin solution containing 10% sodium chloride was added to each of the Extract filtrate. The formation of white buff coloured precipitate indicates the presence of tannins

*Test for alkaloids*

50mls of distilled water was added to 500 mg of each of the Solvent Extracts stirred with about 5 ml of dilute hydrochloric acid separately and filtered. Each of the Extract filtrate was tested with the following reagents:

Dragendroff's test

Few drops of Dragendroff's reagent was added to each Extract filtrate and observed. The formation of orange yellow precipitate indicates the presence of alkaloids.

*Mayer's test*

Few drops of Mayer's reagent was added to each Extract filtrate and observed. The formation of white or cream colour precipitate indicates the presence of alkaloids.

*Tests for flavonoids:*

20mls of distilled water was added to 50 mg of each of the Solvent Extracts stirred and filtered. Each of the Extract filtrate was tested with the following reagents:

*Shinoda's test*

5ml. 95% ethanol was added separately to each of the Extract filtrate. Each mixture was treated with 0.5g magnesium turnings and few drops of conc. HCl. The formation of pink colour indicates the presence of Flavonoids.

*Alkaline reagent test*

Lead acetate solution was added a small quantity of each of the Extract filtrate and observed. The formation of yellow precipitates after few minutes indicates the presence of Flavonoids.

Results are shown in Table 3

*Mineral analysis*

*Sample preparation*

Sample was thoroughly washed with pure water and rinsed with double distilled water in order to remove the sand or dust particles and all other surface contamination. The plant sample was then air dried, grounded and homogenized in an agate mortar and sieve through a 250µm diameter sieve. A quantity of 3.0g mass of the powdered sample was weighed with an analytical balance and placed in a sample cup holder.

*Sample analysis*

Elemental analysis of the sample was performed with a Niton XL3t GOLDD + Hand held X-ray Fluorescence (Thermo Fisher). The Niton Hand held XRF Instrument uses a Ag-anode X-ray tube with a voltage of 50kV and equipped with a Si-drift detector (SDD). Accurate energy and efficiency calibrations of the spectrometer were made using a certified reference material – SRM 1573a – Tomato Leaves supplied by the International Energy Agency (IAEA), Vienna, Austria. The spectrum acquisition time was 480sec for the sample and the dead time was around 50%.

X-Ray Fluorescence has long been recognized as a powerful technique for the qualitative and quantitative elemental analysis [23, 24]. It has the advantage of being non-destructive, multi-elemental, fast and cost-effective. Furthermore, it offers a fairly uniform detection limit across a large portion of the Periodic Table and is applicable to a wide range of concentrations.

In this study, a total of fifteen elements (K, Ca, Mg, Al, Ti, V, Mn, Fe, Cu, Zn, Rb, Sr, Zr, Mo, and Sc) were determined in the dried powdered leaves of *Mezoneurum benthamianum* plant by using EDXRF. The mean concentrations of various metals in the plant sample are shown in Table 4.



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**FIGURE 2: EDXRF used for elemental analysis of powdered plant sample**

## III. Results and Discussions

*Organoleptic evaluation*

The results of organoleptic evaluation of the dried powdered leaves of *Mezoneurum benthamianum* plant are reported in Table 1 below with the photo of the dried powdered leaves of *Mezoneurum benthamianum* plant shown in Figure 3

**Table 1: Showing the results of organoleptic evaluation of the dried powdered leaves of *Mezoneurum benthamianum* plant**

| Plant Organ Investigated | Property Tested | | | | |
|---|---|---|---|---|---|
| | Colour | Odour | Taste | Texture | Particle Size |
| Leaves | Light green | spicy | Slightly Bitter | Fine Powdered | 100 # wire gauge |

The bitter taste indicates that the powdered plant materials contain alkaloids. The colour of the powdered plant material shown in Figure 2 will also help who so ever wish to buy and use the plant material for medicinal purpose. It helps prevent adulteration.

**FIGURE 3: Powdered dry young Leaves of Mezoneurum benthamianum**

*Fluorescence analysis*

The results of fluorescent studies carried out on dried powdered Leaves of *Mezoneurum benthamianum* using different chemical reagents are given in the Tables 2.

The above table showed colour changes in reagents 1M NaOH(aq), 1M NaOH(alc), Ammonia, 50% HCl, and 50% $HNO_3$. Some constituents show fluorescence in the visible range in daylight. The ultra violet light produces fluorescence in many natural products which do not visibly fluoresce in daylight. The above reagents converted the compounds in the powdered plant material into fluorescent derivatives. Fluorescence analysis is one of the parameters for pharmacognostic evaluation of crude drugs [14] in traditional medicinal plants. Thus the process of standardization can be achieved by stepwise pharmacognostic studies as stated above. This research work helps in identification and authentication of the dried powdered Leaves of *Mezoneurum benthamianum* plant material used in traditional medicine. Such information can act as reference information for correct identification the dried powdered Leaves of *Mezoneurum benthamianum* plant and also will be useful in making a monograph of the plant. Further, it will act as a tool to detect adulterants and substituent which helps in maintaining the quality, reproducibility and efficacy of natural drugs.

**TABLE 2: Showing results of fluorescence analysis of dried powdered Leaves of *Mezoneurum benthamianum***

| Test | Powdered plant material | Visible/day light | Ultra violet light |
|---|---|---|---|
| 1 | Powder | Light green | Green |
| 2 | Powder + 1MNaOH(aq) | Light green | Light orange |
| 3 | Powder + 1MNaOH(alc) | Light green | Bright orange |
| 4 | Powder + Ammonia | Light green | Bright orange |
| 5 | Powder + Picric acid | Light green | Yellow |
| 6 | Powder + Petroleum ether | Light green | Black |
| 7 | Powder + 50% HCl | Light green | Light blue |
| 8 | Powder + 50% $H_2SO_4$ | Light green | Light green |
| 9 | Powder + 50% $HNO_3$ | Light green | Cream white |
| 10 | Powder + ethyl acetate | Light green | Green |
| 11 | Powder + Ethanol | Light green | Black |
| 12 | Powder + Methanol | Light green | Black |
| 13 | Powder + $Br_2$ water | Light green | Black |

*Phytochemical screening*

The results of phytochemical screening carried out on the dried powdered Leaves of *Mezoneurum benthamianum* plant are reported in Table 3 below:

**TABLE 3: Showing the results of Phytochemical Screenings of the dried powdered Leaves of *Mezoneurum benthamianum* plant**

| TEST | | SOLVENTS | | | | | |
|---|---|---|---|---|---|---|---|
| Secondary Plant Metabolites | Tests/Reagents | PZ | AC | CHLO | MeOH | EtOH | Water |
| Carbohydrates | Molisch's Test | - | - | + | + | + | + |
| Reducing Sugar | Febling's Test | - | - | + | + | + | + |
| Starch | Iodine Test | - | - | - | + | + | + |
| Saponins | Froth Test | - | - | ++ | + | ++ | +++ |
| Proteins | Biuret Test | + | ++ | ++ | + | ++ | ++ |
| Sterols/Triterpenes | Libermann-Burchard Test | - | - | - | + | + | ++ |
| | Salkowski's Test | - | - | - | + | + | ++ |
| Tannins | Iron(III)Chloride Test | - | +++ | _ | +++ | +++ | +++ |
| | Gelatin Test | - | +++ | + | +++ | +++ | +++ |
| Alkaloids | Mayer's Test | - | - | - | ++ | + | ++ |
| | Dragendroff's Test | - | - | - | ++ | + | ++ |
| Flavonoids | Shinoda's Test | - | - | - | + | + | ++ |
| | Lead acetate Test | - | - | - | + | + | ++ |

KEY: PZ = Petroleum ether, AC = Acetone, CHLO = Chloroform, MeOH = Methanol, EtOH = Ethanol; +++ = Intense; ++ = Moderate; + = Slight; - = Absent

Petroleum ether, acetone, chloroform, methanol, ethanol and aqueous crude extracts of the dried powdered Leaves of *Mezoneurum benthamianum* plant used for the treatment of Haemorrhoid/Piles in Sierra Leone was evaluated for the



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presence of secondary plant metabolites. The results as shown in Table 3, revealed moderate to high contents of carbohydrates, alkaloid, flavonoids, proteins, sterols/terpenes and saponins in the ethanol, methanol and aqueous extracts.

All of the solvent extracts apart from the petroleum ether extract revealed high concentration of flavonoids, tannins. The petroleum ether extracts gave the least concentration of the phytoconstituents investigated.

The detection of the above secondary plant metabolites support the use of the plant in traditional medicine

Flavonoids have been reported to possess multiple biological activities such as anti-inflammatory, anti-diabetic, anti-allergic, antiviral, anticancer etc. [25, 26]. Flavonoids are generally good scavengers of peroxyl radicals, hydroxyl radical and superoxide radicals [27]. Other non-flavonoid phenolic compounds also possess in vitro and in vivo antioxidant activity. One of the well-studied compounds is resveratrol, which has been identified as potential antioxidant, anticancer and ant mutagenic agent [28]. Their antioxidant activities depend on the hydroxyl groups present in their structure.

Steroids have been reported to comprise of phenolic hydroxyl groups which enable them to react with free radicals. They inhibit liposomal lipid peroxidation [29-31].

*Elemental analysis*

The results of elemental analysis of the dried powdered Leaves of *Mezoneurum benthamianum* plant using EDXRF are shown below.

**Table 4: Showing the total contents of elements (in ppm) in the dried powdered Leaves of *Mezoneurum benthamianum* plant**

| Plant Organ | K | ± SD | Ca | ± SD | Mg | ± SD | Al | ± SD |
|---|---|---|---|---|---|---|---|---|
| Powdered leaves | 31249 | 180.00 | 19394 | 188.00 | 8086 | 1470 | 2536 | 220.00 |
| **Plant Organ** | **Ti** | **± SD** | **V** | **± SD** | **Mn** | **± SD** | **Fe** | **± SD** |
| Powdered leaves | 253 | 16.00 | ? LOD | 8.10 | 235.77 | 14.27 | 1101.80 | 17.60 |
| **Plant Organ** | **Cu** | **± SD** | **Zn** | **± SD** | **Rb** | **± SD** | **Sr** | **± SD** |
| Powdered leaves | 19.36 | 4.30 | 86.24 | 2.91 | 41.32 | 1.00 | 66.99 | 0.91 |
| **Plant Organ** | **Zr** | **± SD** | **Mo** | **± SD** | **Sc** | **± SD** | | |
| Powdered leaves | 49.89 | 0.92 | 6.01 | 0.77 | 102 | 16.00 | | |

The results of the current study as shown in Table 4 revealed that all the metals investigated (K, Ca, Mg, Al, Ti, V, Mn, Fe, Cu, Zn, Rb, Sr, Zr, Mo, and Sc) were accumulated in greater or lesser extent in the dried powdered Leaves of *Mezoneurum benthamianum* plant apart from Vanadium which was out of limit of detection of the equipment. The plant organ contained large amounts of nutrients and rich in K (31249 ± 180.00 ppm), Ca (19394 ± 188.00 ppm), Mg (8086 ± 1470 ppm), Al (2536 ± 220.00 ppm) and Fe (1101.80 ± 17.60 ppm). The other elements present in smaller quantities were Ti (253 ± 16.00ppm), Mn (235.77 ± 14.27 ppm), Sc (102 ± 16.00ppm), Zn (86.24 ± 2.91ppm), Sr (66.99 ± 0.91ppm), Zr (49.89 ± 0.92ppm), Rb (41.32 ± 1.00 ppm), Cu (19.36 ± 4.30ppm) and Mo (6.01 ± 0.77ppm).

It has been reported that a lot human health problems are caused by deficiency of trace elements [32]. Zinc deficiency is associated with accelerated aging [33], immunodeficiency [34], accelerated progression of HIV infection [35], increased incidence of abnormal pregnancies [36], developmental retardation in children [37], and taste disorder [38]. It has also been shown that excess of copper in the blood serum of humans causes Nausea, vomiting, heartburn, diarrhea, jaundice, hemoglobinuria, hematuria, oliguria, anuria, hypotension, coma and melena [39, 40 and 41]. The knowledge of the clinical aspects of trace elements is becoming indispensable for front-line clinicians [mm1] and their presence in the dried powdered Leaves of *Mezoneurum benthamianum* plant support the use of the plant in traditional medicine and as a nutrient substitute.

## IV. Summary

Pharmacognostic investigation and mineral analysis of dried powdered leaves of traditional medicinal plant *Mezoneurum benthamianum* used for the treatment of heartburns/pyrosis in Sierra Leone has been carried out. Ethno medical information of *Mezoneurum benthamianum* plant indicated that the plant is widely used across West Africa for the treatment of piles and *ulcers*, as depurative and mildly laxative, cure colic, laxatives and stomach troubles all of which are symptomatic of heartburns/pyrosis in traditional medicine

The results of organoleptic evaluation indicated that the dried fine powdered leaves of *Mezoneurum benthamianum* plant as light green in colour, spicy odour and slightly bitter. The bitter taste indicates that the powdered plant materials contain alkaloids. The colour of the powdered plant material will help who so ever wish to buy and use the plant material for medicinal purpose thus preventing adulteration.

The results of fluorescent studies carried out on dried powdered Leaves of *Mezoneurum benthamianum* using different chemical reagents colour changes with reagents 1M NaOH(aq), 1M NaOH(alc.), Ammonia, 50% HCl, and 50% $HNO_3$. The reagents converted the compounds in the powdered plant material into fluorescent derivatives which is one of the parameters for pharmacognostic evaluation of crude drugs in traditional medicinal plants.

The results of phytochemical screening carried out on the dried powdered Leaves of *Mezoneurum benthamianum* plant revealed the presence of carbohydrates, alkaloid, flavonoids, proteins, sterols/terpenes, tannins and saponins. The detection of the above secondary plant metabolites support the use of the plant in traditional medicine

Flavonoids have been reported to possess multiple biological activities such as anti-inflammatory, anti-diabetic, anti-allergic, antiviral, anticancer, good scavengers of peroxyl radicals, hydroxyl radical and superoxide and steroids react with free radicals by inhibiting liposomal lipid peroxidation.

The results of mineral/Elemental analysis of the dried powdered Leaves of *Mezoneurum benthamianum* indicated that the plant organ investigated contained large amounts of



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nutrients and rich in K (31249 ± 180.00 ppm), Ca (19394 ± 188.00 ppm), Mg (8086 ± 1470 ppm), Al (2536 ± 220.00 ppm) and Fe (1101.80 ± 17.60 ppm). The other elements present in smaller quantities were Ti (253 ± 16.00ppm), Mn (235.77 ± 14.27 ppm), Sc (102 ± 16.00ppm), Zn (86.24 ± 2.91ppm), Sr (66.99 ± 0.91ppm), Zr (49.89 ± 0.92ppm), Rb (41.32 ± 1.00 ppm), Cu (19.36 ± 4.30ppm) and Mo (6.01 ± 0.77ppm).

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## V. CONCLUTION

Pharmacognostic investigation involving organoleptic evaluation, fluorescent analysis, phytochemical screening and mineral analysis of the dried powdered Leaves of *Mezoneurum benthamianum* plant has been carried out in Sierra Leone. The results indicate that the dried fine powdered leaves of *Mezoneurum benthamianum* plant was light green in colour, spicy odour and slightly bitter, gave fluorescent derivatives with the reagents 1M NaOH(aq), 1M NaOH(alc.), Ammonia, 50% HCl, and 50% $HNO_3$ which is one of the parameters for pharmacognostic evaluation of crude drugs in traditional medicinal plants and was rich in K (31249 ± 180.00 ppm), Ca (19394 ± 188.00 ppm), Mg (8086 ± 1470 ppm), Al (2536 ± 220.00 ppm) and Fe (1101.80 ± 17.60 ppm). The other elements present in smaller quantities were Ti (253 ± 16.00ppm), Mn (235.77 ± 14.27 ppm), Sc (102 ± 16.00ppm), Zn (86.24 ± 2.91ppm), Sr (66.99 ± 0.91ppm), Zr (49.89 ± 0.92ppm), Rb (41.32 ± 1.00 ppm), Cu (19.36 ± 4.30ppm) and Mo (6.01 ± 0.77ppm).

The presence of the following secondary plant metabolites; carbohydrates, alkaloid, flavonoids, proteins, sterols/terpenes, tannins, saponins and the concentration of Zn (86.24 ± 2.91ppm) being much higher than Cu (19.36 ± 4.30ppm) the dried powdered Leaves of *Mezoneurum benthamianum* plant support the use of the plant in traditional medicine.

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