



## PHYTOCHEMICAL AND ATOMIC ABSORPTION SPECTROSCOPIC ANALYSIS OF LEAF, STEM AND ROOT EXTRACTS OF *Euphorbia heterophylla*

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### AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author ASI designed the study, performed the statistical analyses, wrote the protocol and wrote the first draft of the manuscript. Author AVIE proof read the manuscript. Author AWC managed the analysis of the study and the Literature seaches. Author UBO supervised the work. All authors read and approved the final manuscript.

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### ABSTRACT

The work was done to analyze the pharmaceutical active ingredients present in the leaf, stem and root of *Euphorbia heterophylla* of the family Euphorbiaceae. The phytochemical screening done using some standard methods indicated the presence of alkaloids, flavonoids, saponins, tanins, steroids and volatile oils. Alkaloids and saponins were absent in the leaf and root respectively. The Atomic Absorption spectroscopic analysis carried out on these different parts of plants showed the presence of some elements such as lead, manganese, nickel, copper, cadmium, magnesium, iron, chromium and calcium which are at different concentrations but lead was found to be absent in the stem. Some of these elements are beneficial to health and those heavy metals present were equally at low concentrations.

**Keywords:** Phytochemical; euphorbia heterophylla; elements; spectroscopy; extracts.

### 1. INTRODUCTION

Plants used as medicine are known as medicinal plants [1], Ojokuku 2010 [2]. "The use of medicinal plants all over the world predates the introduction of antibiotics and other modern drugs into African continent" [3]. "Medicinal plant components remain untapped reservoir for active compounds(phytochemicals) with properties that can potentially perform multiple biological activities such

as anti-inflammatory, antimicrobial, antiviral, antioxidant etc." [4] (Markhosazana, 2015).

Medicinal plants have been encouraged because of their side effects which are relatively minimal, friendly environmental nature and its efficacy in some health cases and issues where orthodox medicine is ineffective [5]. "The use of various parts of plants in the prevention and treatment of many ailments is now experiencing positive awareness especially amongst

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the rural dwellers because of their availability, cheaper prices, effectiveness and resistance to disease causing organisms” [6,7].

*Euphorbia heterophylla* (Wild poinsettia) is native to central and south America, but now widely distributed throughout the tropical and subtropical area of the world where it occurs as weed of cultivated crops [8].

“In Nigeria, the plant is employed in the treatment of bronchitis, asthma and constipation” [9] (Bridges et al., 1992).

The work was aimed at providing an overview of the phytochemical and elemental analysis on the leaf, stem and root of *Euphorbia heterophylla*.

## 2. MATERIALS AND METHODS

The plant samples (leaves, stems and roots) were collected from uncultivated farm land in Obinugwu Autonomous Community, Orlu Local Government Area of Imo state, Nigeria.

Sample preparation – The leaves, stems and roots were separately detached, washed and cut into small pieces. They were dried under room temperature for seven days for the leaves and 14 days for the roots and the stems. The dried materials were differently crushed into powder with grinder. The samples were kept in different air tight containers for subsequent analyses.

### 2.1 Extraction of Plant Materials

The extraction was done using a soxhlet extractor.

Approximately 200ml of the methanol was measured into a 500ml round bottom flask. The flask was attached to the extractor, 500g of samples was extracted for 3 hours. The extracts were concentrated using water bath at 40°C, cooled and corked for further use.

### 2.2 Phytochemical Screening

“The phytochemical tests of the powdered leaves, stems and roots were carried out by the method outlined” by [10,11,12] (Sofowora, 2013).

### 2.3 Preparation of sample for Minerals

2g of the dry sample was collected, heated in a furnace for 2 hours at 550°C, diluted with 20ml, 20% H<sub>2</sub>SO<sub>4</sub> and filter with filter paper. Then measured using FS240AA Agilent atomic absorption spectroscopy.

**Table 1. Results of the Phytochemical analysis of crude samples of Leaves, stems and roots extracts of *Euphorbia heterophylla***

Phytochemicals	Leaf	Stem	Root
Alkaloids	-	+	+
Flavonoid	+	+	+
Saponins	+	+	-
Tanins	+	+	+
Steroids	+	+	+
Volatile oil	+	+	+

**Table 2. Results of the AAS analysis of *Euphorbia heterophylla* leaf**

Metals (ppm)	Leaf
Cobalt	0.00
Lead	0.268
Manganese	1.756
Nickel	0.292
Copper	0.076
Cadmium	0.076
Manganese	23.486
Iron	1.949
Chromium	1.023
Calcium	7.524

**Table 3. Results of the AAS analysis of *Euphorbia heterophylla* stem**

Metals (ppm)	Stem
Cobalt	0.00
Lead	0.00
Manganese	1.026
Nickel	0.370
Copper	0.072
Cadmium	0.084
Magnesium	22.360
Iron	1.313
Chromium	0.981
Calcium	6.255

**Table 4. Results of AAS analysis of *Euphorbia heterophylla* root**

Metals (ppm)	Root
Cobalt	0.00
Lead	0.104
Manganese	1.628
Nickel	0.219
Copper	0.174
Cadmium	0.028
Magnesium	22.453
Iron	0.468
Chromium	1.141
Calcium	6.912

### 3. RESULTS AND DISCUSSIONS

Phytochemical screening of the crude extracts of the leaves, stems and roots of *Euphorbia heterophylla* showed the presence of the following alkaloids, flavonoids, saponins, Tanins, steroids and volatile oil.

“The alkaloids were only detected in stems and roots but absent in the leaves. Alkaloids are very important in medicine and constitutes most of the valuable drugs. They have marked physiological effect on animals” [12,13]. They show considerable pharmaceutical activity [14]. Flavonoids are present in the leaves, stems and roots extracts of *Euphorbia heterophylla*. Olajuyigbe, et al., 2017 reported the Isolation of a flavonoid quercetin from the leaves of the plant.

The leaves are known to possess antibacterial activity [9]. “Flavonoids are anticoagulants (Morrisom, R.T and R.N, 2008). They also help in healing of wounds and in the treatment of skin diseases due to their ability to neutralize the acidity of wounds and inflammatory.” “Tanins were also detected in the three parts of the plants. Tanins have been found to form irreversible complexes with prolinerich proteins [15] resulting in the inhibition of the cell protein synthesis.” “Medicinally, this is important for the treatment of inflamed or ulcerated tissues” [15].

“Indeed, herbs that have tannins as their main component are astringent in nature and are used for treating of intestinal disorders such as diarrhoea and dysentery” [16].

Saponins were detected in the leaf and stem of *Euphorbia heterophylla* supporting the work carried out by [17].

“The presence of saponins and alkaloids have been reported to be responsible for various pharmacological properties with alkaloids exerting toxic effects against cells of foreign organisms” [18].

Steroids detected in the plant is of great importance as they are of interest in pharmacy due to their relationship with such compounds as sex hormones.

“Steroids increases protein synthesis, promoting growth of muscles and bones. They reduce the recovery time needed between training sessions and enable athletes to train more intensively for longer periods” [19].

The atomic Absorption spectroscopic analysis showed the presence of the following metals: Lead, manganese, nickel, copper, cadmium, magnesium, iron, chromium and calcium. Among these metals

magnesium has the highest concentration and that in the leaf. Cobalt is absent in the three parts. Calcium, present in significant concentration, is a supportive element in bone and tooth structure. It is also important to good muscle tone. The results assured the usefulness of these elements in the physiological administration of the crude drug since some of the elements were of health benefit and equally at low concentration.

### 4. CONCLUSION

The result of the study carried out of the leaf, stem and root extracts of *Euphorbia heterophylla* showed that they contain secondary metabolites. This indicates that they are useful in drug manufacture. Also, the result of the atomic absorption spectroscopic suggested that the plant can also will not constitute any harm if inculcated in drug manufacturing.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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