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PHYTOCHEMICAL ANALYSIS (QUALITATIVE SCREENING) OF ALCALYPHA WILKESIANA LEAVES

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ABSTRACT

Acalypha wilkesiana Muell Arg, commonly known as copper leaf, is a member of the Euphorbiaceae family and is renowned for its ornamental value. In this study, we conducted a qualitative analysis of *A. welkesiana*, with a focus on its phytochemical constituents and elemental composition. Through meticulous examination, we have identified the presence of several vital chemical compounds within this plant species, including flavonoids, saponins, tannins, phenols, alkaloids, cardiac glycosides, and phlobatannins. These findings not only illuminate the diverse array of phytochemicals harbored by *A. welkesiana* but also provide valuable insights into its potential applications in the fields of pharmaceuticals and ecology. This study enhances our comprehension of the chemical composition of *A. welkesiana*, unveiling its multifaceted significance in the natural world.

Keywords: *Acalypha wilkesiana*, Phytochemical analysis, Pharmaceutical

INTRODUCTION

Acalypha wilkesiana Muell Arg, also recognized by its common names such as copper leaf, Jacob's coat, or fire dragon, is a prominent member of the diverse Euphorbiaceae family. It is frequently cultivated as an ornamental plant in Nigerian gardens and outdoor spaces, and it can also thrive indoors as a container plant. This evergreen shrub, known by a variety of common names including copper leaf, Jacob's coat, and Flamengueira, is undeniably striking in its visual appeal. *A. wilkesiana*, a botanical species of growing interest, has garnered attention for both its aesthetic appeal and its potential pharmacological significance. With its vibrant red foliage and distinct common name, the "Fire Dragon Plant" (Smith, 2019), this species has found its place as a sought- after ornamental plant.

A. wilkesiana Muell Arg has been documented for its medicinal properties, which are valuable for addressing a range of health condition. Akinde (1986) reported its efficacy in addressing ailments such as malaria, cardiovascular disease, dermatological issues, and gastrointestinal disorders. Ikewuchi *et al*. (2009) have highlighted its potential as an antihypertensive agent, while Oladunmoye (2006) noted its antimicrobial properties. Adesina *et al.* (1980) found that essential oils derived from the plant's leaves exhibit phytochemical and microbiological activities against Staphylococcus aureus and Klebsiella aerogenes. Furthermore, Ogundaini *et al*. (2011) mentioned that the expressed juice or boiled concoction of *A. wilkesiana* is employed for treating gastrointestinal disorders and fungal skin infections, *including Pityriasis versicolor, Impetigo contagiosa, Candida intetrigo, Tinea versicolor, Tinea corporis, and Tinea pedis*. Additionally, in Southern Nigeria, the plant's leaves are consumed as a vegetable to manage hypertension. Local communities in Ado town in Ekiti State and Ilorin city in Kwara State of Nigeria have also reported athe use of *A. wilkesiana* leaves as a herbal remedy for unspecified skin infections in neonates and children up to one-year-old (Alade and Irobi, 1993).

The qualitative analysis of plant constituents has become a crucial field in botanical research, providing insights into the ecological roles, potential pharmacological uses, and distinctive chemical characteristics of diverse plant species. As we embark on this qualitative analysis of *A. wilkesiana*, our objective is to provide a comprehensive and detailed examination of its chemical composition. This endeavor extends beyond mere curiosity, offering potential applications in fields ranging from traditional medicine to ecological research. By shedding light on the intricate chemical makeup of this remarkable plant, we aim to contribute valuable knowledge to the scientific community and inspire further inquiry into the diverse world of plant phytochemistry. This study on comprehensive qualitative analysis of *A. wilkesiana,* is aiming to unveil the intricacies of its phytochemical composition. From flavonoids and saponins to tannins, phenols, alkaloids, cardiac glycosides, and phlobatannins, we will examine the diverse range of chemical compounds that reside within this botanical wonder. Phytochemical analysis of *A. welkesiana* provides valuable insights into the chemical diversity of this plant species. The identified phytochemicals hold promise for future research in pharmacology, ecology, and agriculture.

MATERIALS AND METHOD

COLLECTION PLANT MATERIALS:

Matured fresh leaf of *A. wilkesiana* was collected by hand-plucking from parent plants spotted at different locations at the Chukwuemeka Odumegwu Ojukwu University Uli, Nigeria. The leaf was identified in the herbarium unit of Biological Science Department of the same institution. The leaves were dried for five days at room temperature. The dried leaves were ground into fine powder and stored in air-tight plastic container till use. The research activities were done in Chukwuemeka Odumegwu Ojukwu University Uli, Anambra state, Nigeria.

EXTRACTION OF PLANT EXTRACT:

The powdered sample (100g) was mixed with 500 ml of distilled water in a round-bottomed flask. A reflux condenser was attached to the flask and inserted with a heating mantle. The mixture was refluxed for 30 minutes and filtered with Whatman filter paper No. 1. The filtrate was then evaporated to dryness using an oven at 45°C for 72 hours to a dark viscous substance. The extract was concentrated and stored in a specimen bottle at room temperature until used.

QUALITATIVE ANALYSIS:

Qualitative analysis was carried out to ascertain the presence of the different phytochemical compounds contained in the aqueous extract of *A. welkesiana*. This was done to separate the components into individual compounds for appropriate identification of all components of the aqueous extracts. Qualitative phytochemical analysis of aqueous extracts of *A. wilkesiana* was carried out using the standard procedure as described by Sofowora (1993), Trease and Evans (1989) and Harbone (1973), Odebiyi and Sofowora (1978).

1. Test for flavonoids

An Aqueous extract of about 2ml was added to 5 ml of dilute ammonia solution in a test tube, followed by the addition of 1 ml of concentrated H_2SO_4. A yellow coloration disappeared on standing. The yellow coloration which disappeared on standing indicates a positive test for flavonoids.

2. Test for tannins

A. wilkesiana aqueous extract of 50mg was boiled in 20ml of water in a test and then filtered. A few drops of 0.1% ferric chloride

were added and observed green or a blue–black coloration which confirms the presence of tannin.

3. Test for saponin

0.2g of the extract/sample was shaken with 5ml distilled water and then heated to boiling. Frothing showed the presence of saponins. The frothing was mixed with 3 drops of olive oil and shaken vigorously, then observed for the formation of emulsion (soluble) (Sofowora, 1993).

4. Test for phenols

Ferric chloride test: 4 drops of ferric chloride were added to 2mls of aqueous extract of *A. welkesiana*. The formation of a bluish-black color indicates the presence of phenol.

5. Test for steroids

An Aliquot of 2mls of extract in a test tube was added in 10ml of chloroform and a careful addition of an equal volume of conc. H_2SO_4 was added to the sides of the test tube. The upper layer turned red and the sulphuric acid layer showed yellow with green fluorescence. This indicated the presence of steroids.

6. Test for alkaloids

A small amount (2mg) of the extract was stirred with 5ml of 1% aqueous HCl on a steam bath and filtered while hot. Distilled water was added to the residue. This was divided into two portions. Mayer's reagent (Potassium mercuric iodide- solution) was added to one portion and Draggendorff's reagent (solution of Potassium bismuth iodide) to the other. The formation of cream (with Mayer's reagent) or reddish-brown precipitate (with Draggendorff's reagent) confirmed the presence of alkaloids

7. Test for cardiac glycosides

An aqueous extract of 50 mg was dissolved with 2 ml of glacial acetic acid containing 1 drop of ferric chloride solution. This was under-layered with 1 ml of concentrated sulphuric acid. A brown ring at the interface indicates a deoxysugar characteristic of cardenolides which confirms a positive presence of cardenolides. A violet-green ring appearing below the brown ring, in the acetic acid layer, indicates the positive presence of glycoside. (Odebiyi and Sofowora, 1978).

8. Test for Terpenoids

Five milliliter of the extract was mixed in 2ml of chloroform, and 1ml of acetic anhydride was added following the addition 3ml concentrated H_2SO_4 was carefully

added to form a layer. A reddish-brown coloration at the interface showed positive results for the presence of terpenoids (Sofowora, 1993).

9. Test for Phlobatannins

An aliquot of the extracts (2 mg) was placed in a test tube with 2 ml of 1% aqueous hydrochloric acid (HCl) and boiled for 3 minutes then the samples were observed for the formation of a red precipitate that shows the presence of phlobatannins in the extract.

10. Test for anthraquinones

Borntranger's test: 5 ml of the extract solution boiled with dilute sulphuric acid. Filtered and cooled. The filtrate is extracted with extracted with benzene and 1ml of dilute ammonia was added to it. Rose pink colouration suggested the positive response for anthraquinones.

RESULTS

QUALITATIVE PHYTOCHEMICAL SCREENING RESULT:

The result of qualitative phytochemical screening of aqueous extract of *A. welkesiana* Leaves is shown in Table 1.

Table 1: Qualitative screening of Phytochemicals present in aqueous extract of *A. welkesiana* Leaves

S/N	TEST	RESULT
1	FLAVONOIDS	++
2	TANNINS	+
3	SAPONIN	++
4	PHENOLS	+
5	STEROIDS	-
6	ALKALOIDS	++
7	CARDIAC GLYCOSIDES	++
8	TERPENOIDS	+
9	PHLOBATANNINS	+
10	ANTHRAQUINONES	-

Interpretation: + means Present + + means highly present - Means Absent

DISCUSSION:

The qualitative analysis of *A. wilkesiana* has revealed the presence of various phytochemical compounds in its leaves, including flavonoids, tannins, saponins, phenols, alkaloids, cardiac glycosides, terpenoids, and phlobatannins. These compounds have wide-ranging applications

and potential uses in different fields. Flavonoids are well-known for their antioxidant properties and are often associated with various health benefits, including anti-inflammatory and antimicrobial effects (Havsteen, 2002). The presence of flavonoids in *A. wilkesiana* leaves hints at potential applications in herbal medicine and dietary supplements. Tannins are recognized for their astringent properties and have been traditionally used in tanning, dyeing, and the preservation of natural fibers (Haslam, 1996). Saponins possess surfactant properties and have been investigated for their potential in the pharmaceutical and cosmetic industries (Hostettmann *et al*., 2006). They may find applications in skincare products and emulsifying agents. Phenolic compounds are known for their antioxidant and antibacterial properties, with potential applications in food preservation and pharmaceuticals (Cushnie and Lamb, 2011). Alkaloids are a diverse group of natural compounds with numerous pharmacological activities. They have been used in traditional medicine and may serve as a source for developing new drugs (Balandrin et al., 1988). Cardiac glycosides have a long history of use in treating heart conditions. They may serve as a source of cardiac drugs (Jouad *et al.*, 2001). Terpenoids have wide-ranging applications, including in the fragrance and pharmaceutical industries. They may be valuable for the development of fragrances and therapeutic agents (Tholl, 2015). Phlobatannins have been associated with antioxidant and anti-inflammatory properties (Rice-Evans and Miller, 1997).), suggesting potential applications in dietary supplements and natural remedies.

CONCLUSION:

The qualitative analysis of *A. wilkesiana* leaves has unveiled a diverse array of phytochemical constituents, each with its own potential applications. These findings provide a strong foundation for further research into the development of pharmaceuticals, herbal remedies, cosmetics, and other products that harness the properties of these compounds. Moreover, the ecological and environmental roles of these phytochemicals within the plant merit exploration, underscoring the multifaceted significance of *A. wilkesiana* in various domains.

RECOMMENDATION:

The presence of alkaloids, flavonoids, phenolic compounds, terpenoids, and

tannins reaffirms the traditional uses of *A. wilkesiana* and warrants further investigation to uncover its therapeutic potential and contribute to the broader field of ethnobotanical research. Further investigation is advised to elucidate the therapeutic potential of these compounds and their ecological significance within the context of natural ecosystems.

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