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Phytochemical screening of *Ficus sycomorus* L. bark and *Cleome gynandra* L. aerial parts

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Abstract
Phytochemical screening of the active morphological samples is extremely valuable in giving us information about the nature of constituents found in each plant sample. *Ficus sycomorus* L (Moraceae) grows wild in tropical Africa and Asia. It is used as a traditional medicine for the treatment of infertility and sterility in humans. *Cleome gynandra* is a common, widespread herb with wide range of medicinal uses. The n-hexane chloroform, ethyl acetate, n-butanol and water fractions of the selected plants were investigated for the secondary metabolites including Phenols, Tannins, Flavonoids, Coumarins, Quninous, Alkaloids, Triterpenes, Steroids, Saponins and diterpenes.

Keywords: *Ficus sycomorus*, *Cleome gynandra*, phytochemical screening, secondary metabolites.

1. Introduction
All plants produce chemical constituents, part of their normal metabolic activities [24, 19]. These, can be divided into primary metabolites, such as sugars, amino acids, nucleotides and fats, found in all plants, and secondary metabolites which have no obvious function in a plant's primary metabolism as well as in growth, photosynthesis, or other ''primary'' functions of the plant cell. They may possess an ecological role, as pollinator attractants, represent chemical adaptations to environmental stresses, or to be responsible for the chemical defence of the plant against microorganisms, insects and higher predators [10, 21]. Many plant compounds have an outstanding role in medicine as drugs or as chemical model for the design and synthesis (or semisynthesis) of new drug molecules such as the opiates (from morphine and codeine models), aspirin from the naturally occurring salicylic acid (from willow-Salix spp.), or etoposide (semisynthetic antineoplastic agent derived from the mayapple-Podophyllum peltatum). Their pharmacological and economical value has lost nothing of its importance until today [3, 13, 4].
Ficus sycomorus L (*Moraceae*) locally known as (gemez). It is believed to be one of such medicinal plants that need to be thoroughly evaluated in terms of its active and pharmacological constituents. It is a tropical and sub-tropical plant species. It is a tree attaining up to a height of 20 meters and sometimes reaching 6 meters in, growth with widely spreading branches and a massive crown. Sheep and cattle eat its young foliage [5]. *Cleome gynandra* L. (*capparidaceae*) native in Africa and now widely distributed in tropical and subtropical regions throughout the world. The leaves have anti-inflammatory properties, bruised leaves are rubefacient and vesicant, and are used to treat headache, neuralgia, rheumatism and other localized pains [15].

Materials and Methods
Plants Collection and Identification
Ficus sycomorus bark have been collected from Sinar state at December 2014, while the aerial parts of *Gynandropsis gynandra* were gathered from River Nile state in January.
Samples were Identified and authenticated in Herbarium of Medicinal and Aromatic Plants Research Institute, National Center for Research. Khartoum, Sudan.

Extraction
The fresh samples were dried in shades for 7 days, powdered then used for extraction. Extraction was carried out according to the method described by [9]. The shade-dried samples were socked in 80% ethanol in the ratio of (1:10) at room temperature for 3 days then filtered and they were left to dry at room temperature this process was repeated till the solvent at the last time returned to colourless. The weight of the solid residues were recorded and taken as yield of crude extracts. The yield a percentage was calculated as follows:

Percentage = (weigh of extract/weigh of sample) X 100

Fractionation

The crude extracts were fractionated using liquid- liquid extraction methodology, which were carried by dissolving the samples in dist. H_2O then they were partitioned between n-hexane chloroform, ethyl acetate, and n-butanol using separation funnel apparatus.

Qualitative phytochemical evaluation

Phytochemical screening was conducted to determine the presence of natural products in the fractions of selected plants using standard methods of [21, 16] as following.

Phenols (Ferric chloride test)

To 1ml of extract 2ml of distilled weter were added followed by few drops of 10% ferric chloride ($FeC1_3$). Appearance of blue or green colour indicates presence of phenols.

Flavonoids

Three different tests were used for the identification of flavonoids.

KOH test

Ml of extracts was treated with few drops of 10% potassium hydroxide solution. Formation of intense yellow colour indicates the presence of flavonoids.

Lead acetate Test

Extracts were treated with few drops of lead acetate solution. Formation of yellow colour precipitate indicates the presence of flavonoids.

Tannins (Ferric chloride test)

0.5ml of the extract was boiled with 10ml of distilled water in a test tube and then, few drops of 5% Ferric Chloride solution was added and the reaction mixture was observed for blue, greenish black colour change.

Coumarins

To 1ml of extract, 1ml of 10% NaOH was added formation of yellow colour presents a positive result.

Quinones

To 1ml of extract, 1ml of concentrated sulphuric acid (H_2SO_4) was added formation of red colour shows a positive result.

Alkaloids

Two different tests were used for the identification of alkaloids.

Dragendroff's Test

Filtrates were treated with Dragendroff's reagent (solution of Potassium Bismuth Iodide). Formation of red precipitate indicates the presence of alkaloids.

Wagner's test

To 0.5ml of the extract 2ml of Wagner's reagent (dilute Iodine solution) was added and the reaction mixture is observed for the formation of reddish brown precipitate.

Triterpenes and Steroids (Salkowski test)

Salkowski test was used to identification steroid and terpenoid. To 0.5ml of each of the extract, 2ml of chloroform was added and then 3ml of concentrated H_2SO_4 was carefully added to form a layer. A reddish brown colouration of the interface indicates the presence of terpenoids and steroids.

Diterpenes (Copper acetate Test)

Extracts were dissolved in water and treated with 3-4 drops of copper acetate solution. Formation of emerald green colour indicates the presence of diterpenes

Test for Saponins (Frothing test)

0.5ml of the extract was added to 5ml of distilled water in a test tube. The solution was shaken vigorously and observed for the stable persistent froth.

Results and Discussion

Phytochemical screening revealed that Phenols, Tannins, Flavonoids, Coumarins, Quninous, Alkaloids, Triterpenes, Steroids, Saponins are present in all fractions tested for on the other hand only diterpenes was absent in *Ficus sycomorus*. (Table 1 and table 2)

Table 1: Preliminary screening of secondary metabolites in the fractions of *F. sycomorus.*

Family of compound	Type of test	interference				
		n-hexane	$CHCl_3$	EtOAc	n-BuOH	H_2O
Phenols	$FeCl_3$	+v	+v	+v	+v	+v
Tannins	$FeCl_3$	+v	+v	+v	+v	+v
Flavonoids	KOH	+v	+v	+v	+v	+v
	Lead acetate	+v	+v	+v	+v	+v
Coumarins	NaOH	+v	+v	-v	+v	+v
Quninous	H_2SO_4	-v	+v	+v	+v	+v
Alkaloids	Dragendorff's	+v	+v	+v	+v	+v
	Wagner's	+v	+v	+v	+v	+v
Triterpenes	Salkowski	+v	+v	+v	+v	+v
diterpenes	Copper acetate	-v	-v	-v	-v	-v
Steroids	Salkowski	+v	+v	+v	+v	+v
Saponins	Forth	+v	+v	+v	+v	+v

Table 2: Preliminary screening of secondary metabolites in the fractions of *C. gynandra.*

Family of compound	Type of test	interference				
		n-hexane	$CHCl_3$	EtOAc	n-BuOH	H2O
Phenols	$FeCl_3$	+v	+v	+v	+v	+v
Tannins	$FeCl_3$	+v	+v	+v	+v	+v
Flavonoids	KOH	+v	+v	+v	+v	+v
	Lead acetate	+v	+v	+v	+v	+v
Coumarins	NaOH	+v	+v	+v	+v	+v
Quninous	H_2SO_4	+v	+v	+v	+v	+v
Alkaloids	Dragendorff's	+v	+v	+v	+v	+v
	Wagner's	+v	+v	+v	+v	+v
Triterpenes	Salkowski	+v	+v	+v	+v	+v
diterpenes	Copper acetate	+v	+v	+v	+v	+v
Steroids	Salkowski	+v	+v	+v	+v	+v
Saponins	Forth	+v	+v	+v	+v	+v

The various phytochemical compounds detected are known to have beneficial importance in industrial and medicinal sciences. Plant phenolic compounds especially flavonoids are currently of growing interest owning to their supposed properties in promoting health (anti-oxidants) [18]; Flavonoids have been demonstrated to have anti-inflammatory, antiallergenic, anti-viral, anti-aging, and anti-carcinogenic activity. The broad therapeutic effects of flavonoids can be largely attributed to their antioxidant properties. In addition to an antioxidant effect, flavonoid compounds may exert protection against heart disease through the inhibition of cyclooxygenase and lipoxygenase activities in platelets and macrophages [14]. Tannins are reported to possess physiological astringent and haemostatic properties, which hasten wound healing and ameliorate inflamed mucus membrane and also inhibit the growth of microorganisms by precipitating microbial proteins and making nutritional proteins unavailable for them; they form irreversible complexes with proline rich proteins, resulting in the inhibition of the cell protein synthesis. They have important roles such as stable and potent anti-oxidants [22, 23, 2, 17]. They act as binders and for treatment of diarrhea and dysentery [7]. Tannin also reported to exhibit antiviral, antibacterial, anti-tumor activities. It was also reported that certain tannin are able to inhibit HIV replication selectivity and is also used as diuretic [11]. Plant tannin has been recognized for their pharmacological properties and is known to make trees and shrubs a difficult meal for many caterpillars [1]. Plant steroids are known to be important for their cardiotonic, insecticidal and anti-microbial properties. They are also used innutrition, herbal medicine, cosmetics and they are routinely used in medicine because of their profound biological activities [6]. Saponins have expectorant action which is very useful in the management of upper respiratory tract inflammation; saponins present in plants are cardiotonic in nature and are reported to have anti-diabetic and anti-fungal properties [8, 21, 12].

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