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Asian Journal of Plant Science and Research, 2015, 5(9): 1-4



**Phytochemical analysis of *Guettarda speciosa* Linn.**

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**ABSTRACT**

*Nature is a unique source of structures of high phytochemical diversity, many of them possessing medicinal properties. These phytochemicals have therapeutic value to cure various diseases. The present investigation was carried out to assess the qualitative phytochemicals of *Guettarda speciosa* Linn. leaves on various extracts. The results revealed that the presence of proteins, amino acids, carbohydrates, alkaloids, flavonoids, phytosterol, saponin, phenols, tannins, fixed oil, glycerine, cardiac glycosides, glycosides, terpenoids and coumarin. Among the various extracts water extract exhibited maximum number of secondary metabolites.*

**Key words:** Phytochemicals, therapeutic, qualitative, *Guettarda speciosa*, secondary metabolites.

**INTRODUCTION**

Naturally the plants are filled in earth. These plants are used to treat various disorders by mankind since before recorded history. The plants are prime source of raw materials for plant based curing diseases. It is true that all plants in the world are not having therapeutic values; some plants may have toxic substance. Even without knowing the knowledge about the phytochemicals, ancient man started to utilize the plants as medicine for curing ailments and protection of his body. Recently, there has been a shift in the universal trend of medicine selection from synthetic to herbal medicine, which can say "Return to Nature" [1]. Although modern medicines are available, herbal medicines have retained their image for historical and cultural reasons. As the usage of these herbal medicines has increased, issues and the motto regarding their quality, safety and efficacy in drug industry and developing countries have cropped up [2]. In the scientific era for utilization of green plants every one interested in scientific support before using the traditional and folklore medicine. According to the World Health Organization (WHO), a medicinal plant is defined as any plant, which one or more of its content contain substance that can be used for treatment of numerous diseases or as precursors for synthesis of useful drugs [3]. Specifically, the medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human or animal body [4]. Phytochemicals are biologically active, acting as defense system against diseases and damage and also provide color and flavor to the plants. Phytochemicals are classified as primary and secondary constituents, depending on their role in plant metabolism. Primary constituents (metabolites) include common sugar, amino acids, protein, chlorophyll etc. Secondary constituents are the remaining plant chemicals such as alkaloids, terpenes, flavonoids, lignans, plant steroids, curcumines, saponins, phenolics, flavonoids and glucosides [5]. The *Guettarda speciosa* tree has specific religious faith, being considered as sacred tree; it is cultivated and conserved in many temple premises of Tamilnadu. *Guettarda speciosa* leaves, stem, bark and whole plant are traditionally used for curing cough, cold, wounds, epilepsy, dysentery, head ache, fever, boils, etc. and promoted to grown as ornamental. An attempt was carried out to study the qualitative phytochemicals in *Guettarda speciosa* leaves.

## MATERIALS AND METHODS

### 2.1. Sample collection and preparation

The fresh specimen of *Guettarda speciosa* was collected from Erode, Tamilnadu, India. The plant was authenticated by Botanical Survey of India Southern Regional Circle, Coimbatore, India. The collected leaves were dried under shade with devoid of moisture and then coarsely powdered. Powdered leaves were examined for their phytochemical studies.

### 2.2. Preparation of extract

Leaves of *G. speciosa* powdered materials were extracted in the Soxhlet apparatus successively with different solvents in the increasing order of polarity (Petroleum ether, Chloroform, Acetone, Ethanol and Water). Each time before extracting with the next solvent, the powdered material is dried in hot-air oven below 50°C. Each extract is concentrated by distilling off the solvent and then evaporating to dryness on water-bath [6]. The collected extracts were used for further analysis.

### 2.3. Phytochemical screening methods

Petroleum ether, chloroform, acetone, ethanol and water extracts were subjected to phytochemicals analysis for the presences of various secondary phytoconstituents using standard methods [6, 7, 8, 9].

## RESULTS AND DISCUSSION

The phytochemical screening of *G. speciosa* leaves on various extracts revealed an interesting result. The phytochemical results of all the extracts of *G. speciosa* leaves are shown in Table 1. It showed the presence of secondary metabolites like alkaloids, flavonoids, phytosterol, saponin, phenols, tannins, fixed oil, glycerine, cardiac glycosides, glycosides, terpenoids and coumarin. Water extract showed the presence of secondary metabolites such as alkaloids, flavonoids, phytosterol, saponin, phenols, tannins, fixed oil, gum and mucilage, glycosides, terpenoids and coumarin, ethanol extract possesses alkaloids, saponin, phenols, tannins, glycosides and terpenoids, petroleum ether extract exhibited the presence of alkaloids, phenols, tannins, glycerine, cardiac glycosides and terpenoids, acetone extract have alkaloids, flavonoids, phenols, tannins and terpenoids, whereas chloroform extract showed the presence of phenols, tannins, saponin and terpenoids as secondary metabolites. Generally extracts of *G. speciosa* leaf also revealed presence of proteins, amino acids and carbohydrates. Anthroquinones and phlobatannin were completely absent in all the extracts used. Among the various extracts used for phytochemical screening tests, water extract of *G. speciosa* leaf contained maximum plant metabolites. The variation in the presence or absence of the secondary metabolites in the fractions of plant extracts was due to the differences in the solubility of the metabolites content of the sample in a particular solvent [10].

Similar to the present investigation the presence of alkaloid was investigated in *Guettarda* species [11-17]. The phytochemical profile from the methanol extract of the root bark of *Guettarda platypoda*, detected the presence of flavonoids, cinnamic derivatives, phenylpropanoid glycoside, monoterpenes, sesquiterpenes, diterpenes, triterpenes, steroids, saponins and reducing sugars [18]. Preliminary phytochemical screening of the ethanolic extract of inner bark of *Guettarda speciosa* revealed that presence of alkaloids, flavonoids, carbohydrates, tannins, phenols, gums and mucilage and absence of saponins and steroids [19]. Many researchers worked on various plants for identifying different phytochemicals. The phytochemical studies of *Hippocratea africana* recorded the presence of alkaloids, saponins, cardiac glycosides, flavonoids, tannins and anthraquinones in the plant extract [20]. Flavonoid, tannins, resins, glycosides and terpenoids has been detected from *Pteris vittata* [21]. The qualitative chemical examination of *Jasminum mesnyi* leaves showed the presence of alkaloids, carbohydrates, glycoside, anthraquinone, glycoside, steroids, flavonoids and saponins. The main active compound glycosides and different flavonoids were present in ethanol and aqueous extract [22]. These reports are par with present results.

Plants contain many active compounds such as alkaloids, steroids, tannins, glycosides, volatile oils, fixed oils, resins, phenols and flavonoids which are deposited in their specific parts such as leaves, flowers, bark, seeds, fruits, root, etc. The beneficial medicinal effects of plant materials typically result from the combination of these secondary products [23]. These secondary plant metabolites exert a wide range of biological activities on physiological systems [24].

Many authors reported the biological properties of secondary metabolites like alkaloids possesses antihypertensive, anti-malarial, anticancer, analgesic properties [25, 26], flavonoids have anti-inflammatory, antioxidant, anti-allergic, hepatoprotective, antithrombotic, antiviral and anti-carcinogenic activities [27], phytosterol helps to inhibit the intestinal absorption of cholesterol, anti-inflammatory [28, 29], saponin expressed anti-inflammatory, anti-yeast, antifungal, anti-parasitic, anti-tumor, anti-viral and anti-abortifacient activities [30], phenolic compounds acting as anti-aging, anti-carcinogen, anti-inflammation, anti-atherosclerosis, cardiovascular protection [31], tannin used against diarrhea and dysentery [32], cardiac glycosides used in cardiac disorders [33], terpenoids possesses anti-carcinogenic, anti-malarial, anti-ulcer, anti-microbial activities [34, 35] and coumarin used in the treatment of asthma and lymphedema [36, 37].

In the present study, the test plant showed the presence of all the valuable active compounds and hence it may be responsible for curing various ailments. Due to the presence of these compounds, the extracts possess the medicinal potential to develop novel therapeutic agents.

Table no. 1 - Phytochemical analysis of *G. speciosa* leaves on various extracts

S. no.	Phytochemical constituents	Reagents used / Chemical Test	Solvent extracts				
			PE	CE	AE	EE	WE
1	Proteins and amino acid	Biuret test	+	+	+	+	+
		Millions reagent test	-	-	-	-	-
		Ninhydrin test	-	-	+	-	-
2	Carbohydrate	Fehling's test	-	+	+	+	+
		Benedict's test	-	-	+	+	+
		Molisch test	-	-	+	+	+
3	Alkaloid	Dragandrof reagent test	-	-	+	+	+
		Mayer's reagent test	+	-	+	+	-
		Wagner's reagent test	+	-	+	+	+
4	Flavonoids	Alkaline Reagent Test	-	-	+	-	+
		Acid test	-	-	-	-	+
5	Phytosterol	Salkowaski Test	-	-	-	-	+
6	Saponin	Foam Test	-	+	-	+	+
7	Phenols	Ferric chloride reagent test	+	+	+	+	+
8	Tannins	Ferric chloride reagent test	+	+	+	+	+
9	Cardiac glycosides	Keller-killiani test	+	-	-	-	-
10	Fixed oil	Filter paper test	-	-	-	-	+
11	Gum & mucilage	Swelling test	-	-	-	-	+
12	Glycerine	Sodium hydroxide sulphate	+	-	-	-	-
13	Anthroquinones	Magnesium acetate	-	-	-	-	-
14	Glycosides	HCl+ NaOH+ Fehlings solution A & B	-	-	-	+	+
15	Phlobatannin	HCl	-	-	-	-	-
16	Terpenoids	Chloroform + Conc. H <sub>2</sub> SO <sub>4</sub>	+	+	+	+	+
17	Coumarin	NaOH and chloroform	-	-	-	-	+

PE-Petroleum ether extract, CE-Chloroform extract, AE-Acetone extract, EE-Ethanol extract, WE-Water extract  
 '+' indicates phytochemicals present, '-' indicates phytochemicals absent

## CONCLUSION

From this study it concluded that various extracts of *G. speciosa* leaf possess eminent phytochemical constituents like alkaloids, flavonoids, phytosterol, saponin, phenols, tannins, fixed oil, glycerine, cardiac glycosides, glycosides, terpenoids and coumarin. Among the different extracts water extracts exhibited the presence of valuable secondary metabolites. Further research need for pharmacological activity studies.

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