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RESEARCH ARTICLE

PRELIMINARY PHYTOCHEMICAL SCREENING OF *CHROMOLAENA ODORATA* (L.) R.M.KING & H. ROB. AND *ADHATODA VASICA* NEES

***Gayathri, V. and Bindhu, V.**

Department of Botany, Avinashilingam Institute for Home Science and Higher Education for Women University, Coimbatore – 641043

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ABSTRACT

Chromolaena odorata is a toxic weed belonging to the family Asteraceae, wide spread over many parts of the world including Nigeria. The young leaves are crushed and the resulting liquid can be used to treat skin wounds. The leaves, roots and flowers of *Adhatoda vasica* belonging to the family Acanthaceae also called vasa or vasaka, were used expensively in Traditional Indian Medicine for thousands of years to treat respiratory disorders such as asthma. In the present study, a preliminary screening has been carried out to analyze the presence of various phytochemicals in the two test plants namely, *Chromolaena odorata* and *Adhatoda vasika*. The study revealed the presence of almost all the phytochemicals tested except alkaloids in *Chromolaena odorata*. In *Adhatoda vasika*, most of the phytochemicals were present except for a few extract, where it was absent.

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INTRODUCTION

The medicinal value of plants lies in the bioactive compounds such as alkaloids, flavonoids, tannin and phenolic compounds that produce a specific physiological action on the human body (Hill, 1952). The increasing use of plant extracts in food, cosmetic and pharmacological industries suggests that in order to extract active compounds, a methodical study of medicinal plants is important (Arunkumar *et al*., 2010). Plants are major source of herbal medicines and the presence of secondary metabolites in plants concerned them for many therapeutic activities **(**Sachin Kumar *et al*., 2011**)**. Medicinal herbs have been in use in one form or another, under indigenous systems of medicine like Ayurveda, Siddha and Unani. Various active principles have been isolated from the plants and many of them play a dominating role in the modern therapy. At present, nearly 30% or more of the modern pharmacological drugs are derived directly or indirectly from plants and their extracts govern in homeopathic or ayurvedic medicines (Murugesan *et al*., 2011). The aqueous extract and the decoction from leaves of the plant have been used throughout Vietnam for the treatment of soft tissue wounds and burns. *Adhatoda vasica* is a well-known plant drug in Ayurveda and Unani medicine (Manjunath, 1948). *Adhatoda vasica* is an important medicinal herb used by Naga tribes in India for curing parasitic intestinal worm. In modern medicine, the active ingredient were found to be vasicine, oxyvasicine and vasicinone. The alkaloid present in vasaka is the active ingredient for expelling sputum from the body (Nandre *et al*., 2012). The main objective of the present study is to screen for the phytochemical parameters present in the two test plants namely *Chromolaena odorata* and *Adhatoda vasika.*

**Corresponding author: Gayathri, V.*
Department of Botany, Avinashilingam Institute for Home Science and Higher Education for Women University, Coimbatore – 641043

MATERIALS AND METHODS

Collection of plant samples

The fresh leaves of *Chromolaena odorata* and *Adhatoda vasica* were obtained from Elembulassery Village in Palakkad district of Kerala.

Preparation of leaf powder

The leaves of the two medicinal plants taken for the present study were collected, cleaned and air dried under shade for about three weeks. After drying, the leaves were then blended using a household electric blender. This fine powder was used for phytochemical analysis.

Preliminary phytochemical analysis

The leaf powders of both the plants were dissolved in various solvents and the preliminary phytochemical tests were carried out using the method of Harborne (1984).

RESULTS AND DISCUSSION

In the present study using dry leaf powder, a preliminary phytochemical screening was carried out to identify the active constituents such as alkaloids, flavonoids, steroids, terpenoids, quinone, oil and fat, phenol, starch, anthocyanin, protein, carbohydrate and cellulose present in the leaves of the two medicinal plants (Table 1 & 2).

Table 1. Preliminary phytochemical analysis of *Chromolaena odorata*

Phytochemicals	Water	Chloroform	Ethanol	Petroleum ether	Benzene
Alkaloids	-	-	-	-	-
Flavonoids	+	+	+	+	+
Steroids	-	+	+	-	+
Terpenoids	+	+	-	+	-
Quinone	+	-	-	+	-
Phenols	-	+	+	+	+
Starch	+	+	+	+	+
Anthocyanin	-	-	+	+	-
Protein	-	+	-	-	+
Carbohydrate	+	+	+	+	+
Cellulose	-	-	-	-	-
Oil & fat	-	-	-	-	-

"+" – Present"-" – Absent

Table 2. Preliminary phytochemical analysis of *Adhatoda vasica*

Phytochemicals	Water	Chloroform	Ethanol	Petroleum ether	Benzene
Alkaloids	-	-	-	+	+
Flavonoids	+	+	+	+	+
Steroids	+	+	+	-	+
Terpenoids	+	-	+	+	-
Quinone	-	+	-	+	+
Phenols	-	+	+	+	+
Starch	+	+	+	+	+
Anthocyanin	-	+	+	-	+
Protein	+	+	-	-	+
Carbohydrate	-	+	+	+	+
Cellulose	+	+	+	+	+
Oil & fat	+	+	+	+	+

"+" – Present"-" – Absent

The study showed the following results. The dried and powdered leaves of *Adhatoda vasica* and *Chromolaena odorata* were dissolved in different solvents viz., water, ethanol, chloroform, petroleum ether, benzene and the extracts thus obtained were analyzed for the presence or absence of secondary metabolites. In *Chromolaena odorata,* flavonoids, starch, carbohydrate, cellulose, oil and fat were observed in all the five solvent extracts. Alkaloids were completely absent in all the five solvent extracts of leaves of *Chromolaena odorata.* Protein was observed only in chloroform and benzene extracts. Except for water, phenol content was observed in the other four solvents extracts of *Chromolaena odorata.* Among the five solvent extracts of the leaves of *Chromolaena odorata,* steroids was observed in chloroform, ethanol and benzene, but, terpenoids was seen in water, chloroform and petroleum ether extracts. Quinone was present in water and petroleum ether extracts. Anthocyanin was present only in ethanol and petroleum ether extracts of *Chromolaena odorata*. (Table 1). The phytochemical screening of leaf of *Phyllanthus amarus* revealed the presence of flavonoids, tannins, alkaloids, terpenoids, saponins and cardiac glycosides (Obianime and Uche, 2008). Phytochemical screening of leaves of five medicinal plants i.e. *Phyllanthus amarus, Clerodendrum viscosum, Ailanthus exelsa, Syzigium cumini and Cassia occidentalis* using various solvent extracts revealed the presence of steroids, saponin, alkaloids, flavonoids, glycosides, phenolic compounds, tannin, terpenoids and lignin (Joseph *et al.,*2013). Ketaren Bunga Raya *et al*. (2015) reported that, young plant parts contain higher amount of phytochemicals, ascorbic acid and chlorophyll compared with matured parts confirming that phytochemical content of *Clinacanthus nutans* decreases when plants tend to maturity. The preliminary phytochemical analysis of *Chromolaena odorata* extracts revealed the presence of alkaloids, glycosides, flavonoids, saponins and tannins (Alisi and Onyeze, 2008). The phytochemical analysis showed the presence of phenols, tannins, alkaloids, anthraquinone, saponins, flavonoids and reducing sugars in the leaves of *Justicia adhatoda* (Pathak, 1970).

In *Adhatoda vasica,* among the five solvents used for extraction, petroleum ether and benzene showed the presence of alkaloids. Cellulose, flavonoid, starch, oil and fat were found in all the five solvent extracts of the leaves of *Adhatoda vasica.* (Table 2) Anthocyanin was observed in chloroform, ethanol and benzene extracts, but, steroid was present in four solvent extracts, except petroleum ether. Carbohydrate was present in four solvent extracts except water. Protein was observed in water, chloroform and benzene extracts, whereas, out of the five solvent extracts, water, ethanol and petroleum ether showed the presence of terpenoids. Phenol was present in four of the five solvent extracts, except water. A phytochemical test carried out by Arya *et al*. (2012) on the leaf extracts of *Psidium* revealed the presence of various phytoconstituents like flavonoids, tannins, triterpenoids, saponins, sterols, alkaloids and carbohydrates. Phytochemical analysis is very useful in the evaluation of some active biological components of some vegetables and medicinal plants (Oloyed, 2005). Plants have played a critical role in maintaining human health and civilizing the quality of human life for thousands of years. Medicinal plants have bioactive compounds which are used for curing various human diseases. Thus, analyzing the phytochemical constituents present in the plants is very important commercially and has great interest in pharmaceutical companies for the production of new drugs (Wadood *et al*., 2013).

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