



## PHYTOCHEMICAL CONSTITUENTS OF THE LEAF OF *PLUMBAGO ZEYLANICA* L. A COMMON UNDERSTOREY SPECIES OF HOMESTEAD AGROFORESTS OF KANYAKUMARI DISTRICT, TAMILNADU

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### ABSTRACT

To screen the phyto-constituents present in the leaves of *Plumbago zeylanica* L., a common understory species of homestead agro forests of Kanyakumari district, Tamilnadu. Aqueous, Petroleum ether, Chloroform, Ethanol and acetone extracts of the leaves were prepared by adding 50g of powdered material in Soxhlet apparatus with 250 ml of each of petroleum ether, chloroform, ethanol and acetone. The extracts were filtered through Whatman No.1 filter paper and the solvents were evaporated (at 40°C) with the help of heating mantle. The sticky greenish brown substances were stored in refrigerator, and used for the qualitative phytochemical screening for the identification of various classes of the active chemical constituents. Different phyto-constituents such as Carbohydrates, Glycosides, Flavonoids, Tannins, Saponins, Terpenoids, Steroids, Proteins, Coumarins, Quinones, Alkaloids and Phytosterols were identified in the extracts. These secondary metabolites are potential sources of useful drugs. *Plumbago zeylanica* a reservoir of active phyto-constituents found commonly in the homestead agroforests of Kanyakumari district can be a cheap source of efficacious drugs.

**Key words:** Phyto-constituents, *Plumbago zeylanica* L., Secondary metabolites.



### INTRODUCTION

Plants produce a diverse range of bioactive molecules making them a rich source of different types of medicines [1-5]. Traditionally herbal extracts were known to be effective against microorganisms as a result; plants form the basis of modern medicine. Plants produce phytochemicals to protect themselves; but recent studies indicate that many phytochemicals can also protect humans against infectious diseases [5-10]. Random screening of secondary metabolites is a tool in discovering new biologically active moieties which has been considered as the most productive and successful research in the area of antibiotics. Higher plants, as source of medicinal compounds, have continued to play a dominant role in the

maintenance of human health since ancient times [11].

*Plumbago zeylanica* L. commonly known as ‘Ceylon leadwort’ or ‘doctor bush’ is a branched evergreen herbaceous weed of the family Plumbaginaceae, found throughout India in moist places with glabrous climbing, prostrate or erect stems. The leaves are petiolate or sessile with ovate lance elliptic or spatulate to oblanceolate blades. Flowers are heterostylous with white corollas. Capsules contain reddish brown or dark brown seeds. The whole plant and its roots have been used as folk medicine for the treatment of rheumatic pain, dysmenorrheal, carbuncles, and contusion of the extremities, ulcers and elimination of intestinal parasites [12]. The pharma

ecological studies of various root extracts of *P. zeylanica* have shown that the plant has antimicrobial, antioxidant and anti-inflammatory properties. Considering the pharmacological importance of the plant the present investigation was aimed to screen the bioactive components from the leaves of *P. zeylanica*.

## MATERIALS AND METHODS



### Sample preparation

Leaves of *Plumbago zeylanica* L. were collected from the homestead agroforests of Kanyakumari district and shade dried. The dried plant material was pulverized into fine powder using mortar and pestle. About 50g of powdered material was extracted in Soxhlet extraction apparatus with 250ml of aqueous, petroleum ether, chloroform, ethanol and acetone [13]. The extracts obtained were filtered through Whatman filter paper No.1

and the solvents were evaporated (at 40°C) with the help of heating mantle. The sticky greenish brown substances were stored in refrigerator for future use [14]. Extracts were subjected to qualitative phytochemical screening for the identification of active chemical constituents, using standard procedures [15].

## RESULTS

Preliminary phytochemical screening performed as per standardized procedures showed the presence of varied degree of phytoconstituents present in the aqueous, petroleum ether, chloroform, ethanol and acetone and leaf extracts of *P. zeylanica*.

Carbohydrates showed its presence enormously only in the chloroform leaf extract of *P. zeylanica*. Rest of the leaf extracts failed to show the availability of carbohydrates. Aqueous, petroleum ether and chloroform extracts showed trace amount of glycosides whereas, flavonoids are highly present in aqueous solution, trace in ethanol extract and absent in other solvents. Tannins are present as trace amount in acetone extract and absent in all other solvents. Ethanol and acetone extracts showed the presence of saponins in trace amount and it was completely absent in all the other solvents. Medium amount of terpenoids are present in acetone extract, trace in ethanol extract and absent in other solvents. Acetone extract showed high amount of steroid content, trace in ethanol extract and absent in all other solvents. Medium amount of proteins were noticed in aqueous solution, trace in ethanol extract and absent in all other solvents. High amount of Coumarin was noticed in aqueous solution, medium in both ethanol and acetone extracts and absent in petroleum ether and chloroform extracts. Quinones and alkaloids were present in trace amount in aqueous and ethanol extracts respectively and were completely absent in rest of the solvent extracts. Phytosterol are present as medium amount in acetone extract and absent in aqueous, petroleum ether, chloroform and ethanol extracts.

**Table 1. Preliminary phytochemical screening of *Plumbago zeylanica* leaf extracts**

Phytoconstituents	Extracts				
	Aqueous	Petroleum ether	Chloroform	Ethanol	Acetone
Carbohydrate	-	-	+++	-	-
Glycosides	+	+	+	-	-
Flavonoids	+++	-	-	+	-
Tannins	-	-	-	-	+
Saponins	-	-	-	+	+
Terpenoids	-	-	-	+	++
Steroids	-	-	-	+	+++
Proteins	++	-	-	+	-
Coumarins	+++	-	-	++	++
Quinones	+	-	-	-	-
Alkaloids	-	-	-	+	-
Phytosterol	-	-	-	-	++

**Abbreviations:** + Trace, ++ Medium, +++ High, - Absent)

## DISCUSSION

The use of medicinal plants plays a vital role in covering the basic health needs in developing countries; these plants may offer new sources of antibacterial, antifungal and antiviral agents with significant activity against infective microorganisms [16,17]. The results of phytochemical screening of the aqueous, petroleum ether, chloroform, ethanol and acetone leaf extracts of *Plumbago zeylanica* revealed the presence of carbohydrate, glycosides, flavonoids, tannins saponins, terpenoids, steroids, proteins, coumarins, quinones, alkaloids and phytosterols. The various phytochemical compounds detected from the leaf extracts are known to have beneficial importance in medicines. Due to the presence of phyto constituents crude medicinal preparations of *Plumbago zeylanica* were used in the Indian system of medicine such as Ayurveda and Siddha. Recently a number of studies have been carried out on the phytochemistry of plants across the world [18]. Secondary metabolites have been reported to possess antimicrobial activity [19]. It has been reported previously that ethanol extract and petroleum ether extract from the leaves and stem of *Plumbago zeylanica* L. have antimicrobial properties [20]. Medicinal plants are rich in variety of secondary plant metabolites such as alkaloids, flavonoids, tannins and terpenoids [21, 22]. Secondary plant metabolites exhibit a wide range of biological activities on physiological systems [23]. In a study conducted by Rao *et al* the presence of terpenoids, steroids and sterols were noticed in

the petroleum ether, benzene, chloroform, ethanol and water extracts, alkaloids and Naphthaquinones in the ethanol, petroleum ether, benzene, chloroform and water, flavonoids, phenolics, carbohydrates and aminoacids in the ethanol and water and leucoanthocyanidins in the ethanol extract [24]. On the basis of many studies referred above, it is evident that the leaf extract of *Plumbago zeylanica* L. have a wide range of bioactive secondary metabolites.

## CONCLUSION

In the present study the leaves of *Plumbago zeylanica* showed the presence of various secondary metabolites which have biological activities. These secondary metabolites are potential sources of useful drugs. The plants commonly grow in the homestead agroforests of Kanyakumari district; these can be a cheap source of efficacious drugs. However development and research on *P. zeylanica* through modern pharmaceutical technologies and analytical protocols is essential to assure its quality, safety and efficacy. Future research on this plant would not only provide much needed knowledge, but would also offer a noticeable socio-economic impact in turning a common weed into beneficial nutraceuticals and pharmaceutical products.

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