

Qualitative Phytochemical Screening of Some Locally Available Insecticidal Plants

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ABSTRACT

Qualitative phytochemical screening of ten locally available insecticidal plants such as *Adathoda vasica* (Ness) (Acanthaceae), *Cynodon dactylon* (Linn.) Pers. (Poaceae), *Eclipta alba* (Linn.) (Asteraceae), *Morinda pubescens* J.E. Smith (Rubiaceae), *Ocimum tenuiflorum* (Linn.) (Labiatae), *Phyllanthus amarus* (Linn.) (Euphorbiaceae), *Sesbania grandiflora* (Linn.) (Fabaceae), *Solanum surattense* (Linn.) (Solanaceae), *Solanum trilobatum* (Linn.) (Solanaceae), and *Vinca rosea* (Linn.) (Apocynaceae) were investigated. Petroleum ether (40 – 60° C), hexane, chloroform, ethanol and water were used as solvents. Secondary metabolites steroids, alkaloids, phenolic compounds, flavonoids, saponins, tannins, aromatic acids, and xanthoproteins were analysed using standard procedures. Tannins were found from water and hexane extracts of *S. grandiflora* and *E. alba* respectively. Except the chloroform extract of *A. vasica*, petroleum ether, ethanol extracts of *O. tenuiflorum* and petroleum ether and hexane extracts of *V. rosea* had alkaloids.

INTRODUCTION

Phytochemical surveys are now seen as the first step towards the discovery of useful drugs now that the tropical rain forest has been identified as a potential source due to its diverse richness in flora. Screening for biological activity using simple and fast bioassays has now been added to give a better indication of the usefulness of the plants. Comparative phytochemical examinations of 127 species have been studied by Goh *et al.* (1997). However, very little information is available for the phytochemical studies of these plants. The main objectives of the present work was to study the preliminary phytochemistry of the aerial parts of 10 locally available plants such as *Adathoda vasica*, *Eclipta alba*, *Cynodon dactylon*, *Morinda pubescens*, *Ocimum tenuiflorum*, *Phyllanthus ararus*,

Sesbania grandiflora, *Solanum trilobatum*, *Solanum surattense* and *Vinca rosea*. Subramaniam (1993) reported that *Adathoda trilobatum*, *Ocimum* spp. *Solanum* spp. had been considered as insecticidal plants. Hence it is imperative to study the preliminary photochemistry of these plants. The main objective of the present work was to study the preliminary phytochemistry of the aerial parts of 10 locally available plants.

MATERIAL AND METHODS

Aerial parts of 10 selected plants were collected from Thoothukudi district of Tamilnadu, India. They were washed thrice with distilled water and once with tap water and were shade dried for two weeks. 20 g each of the aerial parts powder samples of *Adathoda vasica* (AV),

Table 1. Plants used for the preliminary phytochemical screening

S.No.	Common name	Botanical name	Family	Parts used
1	Adathodai	<i>Adathoda vasica</i> (Ness.)	Acanthaceae	Aerial parts
2	Arukampillu	<i>Cynodon dactylon</i> (Linn.) Pers.	Poaceae	Aerial parts
3	Kayyantakara	<i>Eclipta alba</i> Linn.	Asteraceae	Aerial parts
4	Manjanathi	<i>Morinda pubescens</i> J.E. Smith	Rubiaceae	Aerial parts
5	Tulsi	<i>Ocimum tenuiflorum</i> (Linn.)	Labiatae	Aerial parts
6	Keelanelli	<i>Phyllanthus amarus</i> Linn.	Euphorbiaceae	Aerial parts
7	Agathikeerai	<i>Sesbania grandiflora</i> (Linn.)	Fabaceae	Aerial parts
8	Thoothuvalai	<i>Solanum trilobatum</i> (Linn.)	Solanaceae	Aerial parts
9.	Kandan kathiri	<i>Solanum surattense</i> Linn. (= <i>xanthocarpum</i> Schrad & Wendl)	Solanaceae	Aerial parts
10	Nithyakalyani	<i>Vinca rosea</i> Linn.	Apocynaceae	Aerial parts

Table 2. Preliminary phytochemical screening tests

S.No.	Tests	Observation	Inference
1.	Test solution + minimum amount of CHCl_3 + 3 drops of acetic anhydride + 2 drops of conce H_2SO_4 (Lieberman – Burchard test)	Purple colour changing to blue or green	Presence of steroids
2.	Test solution + piece of tin + 3 drops of thionyl chloride	Violet or purple colour	Presence of Triterpenoids
3.	Test solution shaken with 2 N HCl. Aqueous layer formed, decanted and to which are added one or two drops of Mayer's reagent added	White turbidity or precipitate	Presence of alkaloids
4.	Alcoholic solution of test solution + one drop of ferric chloride	Intense colour	Presence of phenolic compounds
5.	Test solution + NaHCO_3	Brisk effervescence	Presence of aromatic acids
6.	Test solution + H_2O and shaken well	Foamy lather	Presence of saponins
7.	Water soluble portion of the extract tested with basic lead acetate solution	White precipitate	Presence of tannins
8.	Test solution + magnesium powder and treated with concentrated HCl and heated. Cool the test tube under the running water	Orange colour	Presence of Flavonoids

Eclipta alba (EA), *Cynodon dactylon* (CD), *Morinda pubescens* (MP), *Ocimum tenuiflorum* (OT), *Phyllanthus ararus* (PA), *Sesbania grandiflora* (SG), *Solanum trilobatum* (ST), *Solanum surattense* (SS) and *Vinca rosea* (VR) separately were successively extracted with petroleum ether ($40^\circ - 60^\circ \text{C}$), hexane, chloroform, ethanol and water in a soxhlet apparatus. The extracts were tested for steroids, triterpenoids, alkaloids, phenolic compounds, flavonoids, saponins, tannins, and aromatic acids. The various phytochemical tests were performed (Brinda *et al.*, 1981) with slight modifications to find out the secondary metabolites are presented in Table 2.

RESULTS AND DISCUSSION

Air-dried aerial parts of *Adathoda vasica* (AV), *Eclipta alba* (EA), *Cynodon dactylon* (CD), *Morinda pubescens* (MP), *Ocimum tenuiflorum* (OT), *Phyllanthus ararus* (PA), *Sesbania grandiflora* (SG), *Solanum trilobatum* (ST), *Solanum surattense* (SS) and *Vinca rosea* (VR) are successively treated with petroleum ether ($40^\circ - 60^\circ \text{C}$), hexane, chloroform, ethanol and water. The results of different extracts have been tested for steroids, triterpenoids, alkaloids, phenolic compounds, saponins, tannins, flavanoids and aromatic acids and are presented in Table 3.

True triterpenoids, steroids, saponins and cardiac glycosides are the classes of terperpenoids. Tannins are considered as an important compound, which act as a

barrier to herbivory (Anathakrishnan, 1992). It was reported only in *E. alba* and *Solanum trilobatum*. Harbone (1984) reported that flavonoids were mainly water insoluble and they could be extracted only with ethanol. However, in the present study, it was recorded that water extract of *Adathoda vasica*, *Cynodon dactylon*, *Morinda pubescens* and *Ocimum tenuiflorum* and petroleum ether extracts of AV showed the presence of flavonoids. Almost all the plants of the plant kingdom posse's flavones and flavonols. Another water insoluble chemicals present in the plant are phenolic compounds (says Harbone, 1984). But the present study shows that both *Ocimum tenuiflorum* and *Vinca rosea* consist of phenolic compounds. Both tannin and flavonoids are collectively called polyphenls. Results showed that none of the 10 plants posses polyphenols. They mainly reduce damage caused by insects through their deterrent and/or antifeedant effects (Echeverri *et al.*, 1991; Palvela, 2006). But tannin and flavonoids were reported in many plants. This study helps the pest control practitioners to select the plants without detailed studies related to phytochemistry of the locally available plants. All the plants possess at least three or more than three secondary metabolites. So they can be utilized as pesticidal plants. However, the quantity may be determined before selecting them for pest management purpose.

Table 3. Phytochemical screening of the aerial parts of 10 selected plants

Extracts	Steroids	Triterpenoids	Alkaloids	Phenolic	Saponins compounds	Tannins	Flavonoids	Aromatic acids
Petroleum Ether (40 ^o – 60 ^o C)	AV, CD, EA, MP, OT, PA, SG, SS, ST	-	OT, VR	EA, VR	AV, CD, MP, OT, PA, SG, SS, ST	-	AV	AV, CD, EA, MP, OT,
Hexane	EA, VR	-	VR	CD, OT, SG	AV, CD, EA, MP, OT, PA, SG, SS, ST, VR	EA	-	MP, PA, ST
Chloroform	AV, CD, EA, MP, OT, PA, SG, SS, ST, VR	PA, SS, VR	AV,	SG	AV, CD, MP, OT, PA, SG, SS, ST	-	-	OT, VR
Ethanol	AV, CD, EA, MP, OT, PA, SG, SS, ST, VR	-	OT	AV	OT, PA	-	-	AV, CD, MP, SG, ST
Water	OT, SG, VR	-	-	OT, VR	AV, MP, OT, PA, SG, SS	SG	AV, CD, MP, OT	SS

Adathoda vasica – AV, *Eclipta alba*- EA, *Cynodon dactylon*- CD, *Morinda pubescens* – MP, *Ocimum tenuiflorum* – OT, *Phyllanthus ararus*- PA, *Sesbania grandiflora* – SG, *Solanum trilobatum* – ST, *Solanum surattense* – SS and *Vinca rosea* - VR

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