

Economically Useful Plants of Sri Lanka. Part III*. A Phytochemical Screening of One Hundred Medicinal Plant Materials from Ayurvedic Shops

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(Paper accepted : 14 January 1980)

Abstract : Over one hundred medicinal plant materials from Ayurvedic shops have been screened for the occurrence of alkaloids, saponins, steroids/terpenoids, cardiac glycosides and flavonoids. Therapeutic significance of these classes of compounds are outlined and wherever possible the traditional medicinal uses of these plants are discussed with reference to the class(es) of natural product(s) detected in them.

1. Introduction

In Sri Lanka, various systems of indigenous medicine utilising medicinal plants are widely practised. This is true especially in rural areas. Even in certain parts where modern health care is readily available, traditional and indigenous systems of medicine have co-existed for many decades. In fact, it has been estimated that the traditional system of medicine in Sri Lanka meets the basic health needs of about 70% of the population.²¹

The therapeutic value of medicinal plants is no doubt due to the presence of biologically active natural products. The goal in investigating plants for biologically active or medicinally useful compounds should be to isolate the one or more constituents responsible for a particular activity. Farnsworth points out⁶ that in the phytochemical investigation of a particular plant phytochemical screening techniques can be a valuable aid. It is valuable as reliable methods are available for the detection of some important classes of biologically active phytoconstituents such as alkaloids, saponins, cardiac glycosides, steroids/triterpenoids and flavonoids.⁷

Two systematic phytochemical surveys of Sri Lanka plants for alkaloids have been reported.^{15,18} Although several medicinal plants were included in the above studies many were left out. Though alkaloids have been recognised as an important class of pharmacologically active compounds,⁹ no systematic survey of Sri Lankan medicinal plants for alkaloids has been conducted hitherto ; neither has it been done for the other biologically active phytoconstituents mentioned earlier.

As a part of our preliminary study of economically¹¹ and medicinally¹⁰ useful plants we have initiated a phytochemical screening of medicinal plants and herein we report our results obtained on over one hundred medicinal plants commonly employed in Sri Lanka.

*For Part 2 see A. A. L. Gunatilaka, S. Sotheeswaran and S. Balasubramaniam, *J. Natn. Sci. Coun. Sri Lanka*, 1978, 6, p. 121-128.

2. Experimental

All plant materials were purchased from Ayurvedic shops in Kandy. Wherever possible the part of the plant was identified and was then powdered in a mill.

2.1 Extraction of plant constituents

The powdered plant part (100g.) was extracted with about 300 ml of rectified spirit in a conical flask. A filter funnel was placed into the neck of the flask which acted as a condenser to prevent evaporation of solvent. After about one hour of refluxing on a steam bath, the flask was cooled to room temperature. The mixture was filtered and the plant material was washed with *ca* 50 ml of fresh rectified spirit. The total volume of the extract was measured and portions were used in the screening tests.

2.2 Screening for alkaloids

A volume equivalent of 50g of plant material was evaporated to dryness. 2N-HCl (10.0 ml.) was added and the mixture was heated on a steam bath for 5 min, with stirring. This was filtered and was divided into four equal parts in separate test tubes.

- (a) A few drops of Mayer's reagent were added to one of the test tubes and was observed for slight turbidity (+), definite turbidity (++) or heavy precipitate (+++).
- (b) A few drops of Wagner's reagent were added to the second test tube and observations were recorded as in (a).

If no precipitate or turbidity was observed in either of the two test tubes, then alkaloids were assumed to be absent from the plant material being examined.

If positive results for Mayer's or Wagner's tests were noted then the two remaining fractions were combined, basified with concentrated ammonia ($pH = 9$) and the solution was extracted with chloroform. The combined chloroform extracts were dried ($MgSO_4$) and the concentrated solution was subjected to a thin layer chromatographic (TLC) examination. The developer solvent was either chloroform-methanol (9 : 1) or chloroform-methanol (19 : 1). The TLC plates were sprayed with iodoplatinate or Dragendorff reagents.

2.3 Screening for Saponins

Froth Test : The plant material (100 mg) was taken in a test tube and water (10 ml) was added. The mixture was shaken vigorously. If a froth formed remained 3 cm above the water level for more than 1/2 hr, the test was considered positive.

Haemolysis Test : Only froth positive plant materials were subjected to this test. A medium double layered plate of 5% bovine red-cell suspension in isotonic phosphate buffer of pH 7.4 in 1.5% agar-buffer was overlaid on 1.5% agar-buffer. A disc of filter paper was saturated with the plant extract dissolved in phosphate buffer, and was placed on the surface of the well dried agar plate. The disc was left for 24 hr, and was observed for haemolysed zone, if any.

A plant extract which answered the froth, haemolysis and the Liebermann-Burchardt test (see below) was considered to contain saponins.

2.4 Screening of Steroids/Triterpenoids

Salkowski Test : A volume equivalent to 10 g of plant material was evaporated to dryness. The residue was stirred with light petroleum (10 ml) and the organic layer was discarded. The residue was dissolved in chloroform (10 ml) and was divided into three test tubes. One test tube was held at an angle of 45° and 2 ml of conc. H_2SO_4 was allowed to run down the inside of the test tube. Sulphuric acid was gently mixed and a cherry red colour if formed was considered to be indicative of the presence of unsaturated steroids. The solution in the second test tube was used as a reference solution.

Liebermann-Burchardt Test : To the third test tube about three drops of acetic anhydride was added. After mixing, one drop of conc. H_2SO_4 was added and after further mixing the colour changes were observed immediately and over a period of one hr. The presence of a bluish-green colour was considered to indicate the presence of steroids whilst a red, pink or violet colour was considered to indicate the presence of triterpenoids. A pale yellow colour was considered to indicate saturated sterols/triterpenes.

2.5 Screening for Cardiac glycosides

If Salkowski and Liebermann-Burchardt tests gave positive results, then the Kedde Test (for the presence of unsaturated lactones) and Keller-Killiani (for the presence of 2-deoxy sugars) Test were performed. If the latter two tests were positive then the plant extract was considered to have cardiac glycosides.

Kedde Test :

On the centre of a piece of filter paper 0.2 ml of the rectified spirit extract of the plant material was placed and a circular chromatography was performed with chloroform as the developer. The paper was dried and was sprayed with the Kedde reagent (2% methanolic solutions of 3, 5-dinitrobenzoic acid mixed in equal volumes with 2N KOH). The paper was air dried and the formation of a purple spot was considered to give a positive result.

Keller-Killiani Test :

The original rectified spirit extract (10 ml) was evaporated to dryness. The dried extract was defatted with light petroleum. The residue was treated with 3 ml of the FeCl_3 reagent (0.3 ml of 10% FeCl_3 in 50 ml of glacial acetic acid). The test tube was held at an angle of 45° and 2 ml conc. H_2SO_4 was added carefully along the wall of the test tube. If a purple ring was observed at the interphase, this was considered to be a positive response to the Keller-Killiani test.

2.6 Screening for flavonoids

A volume equivalent to 3g of the plant material was evaporated to dryness. The residue was de-fatted with light petroleum and was dissolved in 2 ml rectified spirit. The solution was divided into two test tubes. To one conc. HCl (0.5 ml) and *ca* three magnesium turnings were added and if an exothermic reaction occurred the test tube was cooled and was shaken with octanol. The colour of the solution was observed and was compared with the colour of the solution in the second test tube. A colour change to orange, red, crimson within ten minutes indicated the presence of flavonoids in the plant extract.

3. Results and Discussions

All plant materials were purchased using their Sinhala names. Their probable botanical names, synonyms and Tamil names were obtained from published works (see Table), which give these names as against the Sinhala names. However, for the following plant materials sold no botanical names were available : agil, heen-aratha, kurasaani, maha-aratha, morawessa, thuvarala, walangassaal and wal-anoda. In some instances an accurate assignment of the botanical names was not possible, as a number of species belonging to a single genus bear the same Sinhala name (e.g. all *Sida* species are called *bevilas*).

In each case the plant material was extracted with hot rectified spirit and the extract was subjected to a phytochemical screening for alkaloids, saponins, steroids/triterpenoids, cardiac glycosides and flavonoids by the method of Farnsworth and co-workers.⁷ The results of the screening of one hundred and four medicinal plants are presented in the Table which gives also the medicinal uses of these plants.

Out of the 104 samples tested, 68 (*ca* 65%) were shown to be alkaloid positive. The probable number of alkaloids present in each extract was obtained from a TLC analysis and is indicated in the Table 1. The incidence here is very much higher than the estimated distribution of alkaloids in vascular plants (i.e. *ca* 15% to 20%).¹³ It is possible that alkaloids may be responsible for the pharmacological action of the majority of plants included in this study. The negative alkaloid reaction obtained for *Sida rhombifolia* (Malvaceae) is surprising as this species has been reported to contain alkaloids.¹² It is possible that either the alkaloid content was below the detectable level or that this is a case of mistaken identity.

TABLE I.

Family Botanical Names (Sinhala, Tamil names)	Reported Medicinal Uses	Plant Part(s) Used ^b	Screening results ^c			
			Alkaloids (No. of alkaloids by t.l.c) ^d	Saponins	Steroids/tri- terpenoids	Cardiac Glycosides Flavonoids
ACANTHACEAE						
<i>Barleria mysorensis</i> Roth. (= <i>Barleria prionitis</i> L.) (S : Katukarandu ; T : Varamula)	Antiseptic, ⁴ Catarrhal affections of children ¹		++ (1)	--	+	--
<i>Hygrophylla spinosa</i> (S : Ikiriya)		Wp	--	--	+	--
APOCYNACEAE						
<i>Holarrhena antidysenterica</i> (L) Br. (S : Kolindahaal)			+++ (2)*	--	--	--
<i>Rauwolfia serpentina</i> (L.) Benih ex Kurz (S : Ekaweriya ; T : Covanna milpori)	Antidote to reptile venom, dysentery, emmenagogue ¹	Rt	+++ (4)	--	+	--
<i>Rejva dichotoma</i> (Roxb.) Gamble (S : Divi-kaduru ; T : Nanthiyavata)	Cooling agent for boils		+	--	--	--
ARACEAE						
<i>Acorus calamus</i> L. (S : Wadakaha ; T : Vashambu)	Rheumatism ¹	Rh	++	--	--	--

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ARISTOLOCHIACEAE						
<i>Aristolochia indica</i> L. (S : Sapsanda ; T : Perularundu)	Fever, attenuant, emmenagogue ¹		+ (2)	--	--	--
ASCLEPIADACEAE						
<i>Hemidesmus indicus</i> (L.) Ait. f. (S : Eramasu ; T : Nanari)	Skin diseases ⁴	Bk	++ (1)	--	+	+
BIGNONIACEAE						
<i>Oroxylum indicum</i> (L.) Vent (S : Totila ; T : Vanga adanthay)	Dasamula decoc- tion, dysentry		+ (2)	+	+	--
<i>Stereospermum suaveolens</i> (Roxb.) DC (S : Palol ; T : Padri)	Dasamula decoction ¹		+++ (3)	--	+	--
CAPPARIDACEAE						
<i>Cratava religiosa</i> Forst. f. (S : Lunuwarana ; T : Marilankai)	Lithonriptic action ³	Bk	+ (5)*	--	--	--
COMBRETACEAE						
<i>Terminalia arjuna</i> (Roxb) Wight Arn (S : Kumbuk ; T : Vellai maruthu)	Astringent, cardiac stimulant, dysentry, fever, heart diseases ⁵	Bk	--	+	--	+
<i>Terminalia belerica</i> (Gaertn) Roxb. (S : Buttu ; T : Tantri)	Astringent, laxative ³	Fr	+++ (2)	+	+	--

<i>Terminalia chebula</i> Retz. (S : Aralu ; T : Kadukkay)	Laxative gum ⁴	Fr	++ (2)*	+	+	+	+	+	+	
COMPOSITAE										
<i>Anacyclus pyrethrum</i> (S : Akkarappata ; T : Akki-rakaram)	Alleviation of bronchitis, stimula- tion of salivary glands ⁴	Tw	++ (3)	—	+	+	+	+	+	
<i>Vernonia anthehmintica</i> (L.) Willd. ² (S : Sanninayan ; T : Kattushirgam)	Leucoderma ¹	Tw	+	—	—	—	—	—	+	
<i>Vernonia anthehmintica</i> (L.) Willd. ² (S : Bodhi ; T : Karpokarishi) (<i>Psoralea corylifolia</i> LEGUMINOSAE) ³	Leprosy, Leucoderma ^{1,3}	Sd	—	—	+	+	+	+	—	
CONVOLVULACEAE										
<i>Evolvulus alsinoides</i> (L.) L. (S : Vishnukranti)	Bronchitis, asthma, antidysentric ⁴ antiseptic	Wp	++ (2)	—	+	+	+	+	—	
<i>Ipomoea mauritiana</i> Jacq. (S : Kiribadu ; T : Nelikumbalu)	Aphrodisiac ¹		—	—	—	—	—	—	—	
<i>Operculina terpenitum</i> (L.) Manso. ² (S : Trastavali ; T : Sivadaai) (<i>Ipomoea terpenitum</i>)	Purgative ¹		+++ (4)	—	—	—	—	—	—	
CRUCIFERAE										
<i>Brassica juncea</i> (L.) Coss. (S : Aba ; T : Kaduku)	Rheumatism ¹	Sd	+++	—	—	—	—	—	+	

Family Botanical Names ^a (Sinhala Tamil names)	Reported Medicinal Uses	Plant Part(s) Used ^b	Alkaloids (No. of alkaloids by t. l. c.) ^d	Screening results ^c			
				Saponins	Steroids/tri- terpenoids	Cardiac Glycosides	Flavonoids
CUCURBITACEAE							
<i>Cucumis melo</i> (S: Pitikekiri; T: Velapalam)	Cooling, diuretic ³	Tw & Lf	++ (2)	—	+	—	+
ERYTHROXYLACEAE							
<i>Erythroxylum monogynum</i> DC. (S: Devadara)		St	—	—	+	—	—
EUPHORBACEAE							
<i>Apurosa cardiosperma</i> (Gaertn) Merr. (S: Pathpadagam)	Nervous depres- sions, chronic malaria ⁴ and febrifuge	Wp	++	—	+	—	+
<i>Phyllanthus emblica</i> L. (S: Nelli; T: Nelli)	Haemorrhage, diarrhoea, dysentry, scurvy, ⁴ diuretic, laxative, anaemia	Fr	++ (1)	—	+	—	+
<i>Croton tiglium</i> L. (S: Jayapala; T: Neervalam)	Purgative ¹	Sd	+++ (4)*	—	—	—	—
GRAMINEAE							
<i>Panicum antidotale</i> Retz. (S: Krimisastru)	Vermifuge ¹		++ (3)	—	+	—	+
<i>Vetiveria zizanioides</i> (L.) Nash (S: Savendara)	No medicinal uses, used as a perfume ⁴	Rt	++ (3)	—	+	—	—
HIPPOCRATEACEAE							
<i>Salacia reticulata</i> Wight (S: Kotala-himbutu-wel)	To allay thirst in cases of diabetes		—	+	+	—	+

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			Alkaloids (No. of alkaloids by t. l. c.) ^d	Saponins	Steroids/irriterpenoids	Cardiac Glycosides	Flavonoids
<i>Pterocarpus santalinus</i> L.f. (S : Rat handun ; T : Santhanum)	Cooling, astringent, headache ³	St	—	—	+	+	+
<i>Pongamia pinnata</i> (L.) Pierre (S : Karanda)	Dysentery and skin diseases ¹	St	—	—	+	—	+
<i>Tephrosia purpurea</i> (L.) Pers. (S : Pila ; T : Kavillai)	Asthma, cough, blood purification, bleeding piles, gonorrhoea, dyspepsia ^{3,4}	Rt	++ (3)	—	+	—	+
<i>Trigonella foenugraceum</i> L. (S : Ulhal ; T : Venihayam)	Diarrhoea ⁶		—	+	+	—	—
LILIACEAE							
<i>Asparagus racemosus</i> Willd. (S : Hatawariya ; T : Sathkawari)	Hair oil, chronic rheumatism ¹	Rh	—	—	—	—	+
LOGANIACEAE							
<i>Strychnos potatorum</i> L.f. (S : Igin ; T : Tetramkottai)	Diuretic ¹	Sd	—	—	+	—	—
LYTHRACEAE							
<i>Woodfordia fruticosa</i> (L.) Kurz. (S : Malitha)	Stimulant, astringent dysentery, irritant, haemorrhage ³	Fj	+	—	—	—	+

MAGNOLIACEAE									
<i>Michelia champaca</i> L. (S : Sapu ; T : Sanpakam)	Astringent, diuretic, dyspepsia, nausea, fevers ³	Fl	+++ (3)	-	+	-	+	-	+
MALVACEAE									
<i>Sida cordifolia</i> L. (S : Wal-bevila ; T : Sevakanpundu)	Fever, urinary complaints ¹	Wp	+	-	-	-	-	-	+
<i>Sida rhombifolia</i> L. (S : Koti-kan bevila ; T : Ariwal-manappundu)	Fever, urinary complaints ¹	Wp	-	-	-	-	-	-	-
MELIACEAE									
<i>Azadirachta indica</i> A. Juss. (S : Kohomba ; T : Vembu)	Antiseptic, astringent, fever, skin diseases ³ rheuma tism, leprosy ³	Bk	-	-	+	-	+	-	+
<i>Azadirachta indica</i> A. Juss. (S : Kohomba, T : Vembu)		Sd	+++ (2)	-	+	-	+	-	-
<i>Munronia pumila</i> Wight (S : Bin-kohomba ; T : Nilavembu)		Wp	+++ (3)	-	+	-	+	-	+
MENISPERMACEAE									
<i>Cissampelos pareira</i> L. (S : Diyamitta)	Muscle relaxant, relieves pain, snake bite, scorpion stings ⁴	St	+++ (5)	-	+	-	+	-	-
<i>Coscinum fenestratum</i> (Gaertn) Colebr. (S : Weni-wel ; T : Maramanchal)	Tetanus, asthma, urine trouble, fever, bronchitis, tuberculosis ⁴	Bk, Tm	+++ (6)	-	-	-	-	-	-

Family	Reported Medicinal Uses	Plant Part(s) Used ^b	Screening results ^c				
			Alkaloids (No. of alkaloids by t. l. c.) ^d	Saponins	Steroids/triterpenoids	Cardiac Glycosides	Flavonoids
<i>Thiospora cordifolia</i> (Willd.) Miers ex Hook. f. (S : Rasakinda ; T : Amuthawalli)	Fever, jaundice, skin diseases, rheumatism, Urinary diseases, stomach irritability ¹	St	+	—	—	—	+
MORACEAE							
<i>Ficus religiosa</i> L. (S : Bo ; T : Arasu)	Astringent, fever dysentery ¹	Sd	—	—	+	+	—
MYRISTICACEAE							
<i>Myristica fragrans</i> Houtt (S : Sadikka ; T : Sadikai)	Carminative, digestive expectorant ¹		—	—	—	—	+
NYCTAGINACEAE							
<i>Boerhavia diffusa</i> L. (S : Pitasudu-pala ; T : Mukkarachi)	Laxative, diuretic, stomachic, prescribed in jaundice, dropsy ¹	Rt, Lf	—	—	—	—	+
NYMPHAEACEAE							
<i>Nelumbo nucifera</i> Gaertn. (S : Nelum ; T : Tamarai)	diuretic ⁴ for fever as a refrigant ⁴	An	+	—	+	—	—
PEDALIACEAE							
<i>Petalium mirex</i> L. (S : Et-nerenchi ; T : Peru neruji)	Gonorrhoeal rheumatism ¹		—	—	—	—	+

PIPERACEAE									
<i>Piper chaba</i> (S : Siviya)				+++ (1)	-	+	-	-	-
<i>Piper cubeba</i> L. f. (S : Wal-gammiris)	Fr			+	-	+	+	-	-
<i>(Ocimum basilicum</i> L. LABIATAE)									
<i>Piper longum</i> L. (S : Tippili ; T : Thippili)	Sd	Carminative, expectorant stimulant ¹		++ (2)	-	+	+	-	-
<i>Piper nigrum</i> L. (S : Gammiris ; T : Milaku)	Sd			+	+	+	-	-	-
PLUMBAGINACEAE									
<i>Plumbago indica</i> L. (S : Rat-nitul ; T : Chittira)		Astringent, fever ¹		-	-	-	-	-	+
PUNICACEAE									
<i>Punica granatum</i> L. (S : Delum ; T : Mathulai)	Fr	Dysentry, cooling ³		+	-	-	-	-	+
RANUNCULACEAE									
<i>Aconitum heterophyllum</i> (S : Atiudayan ; T : Atiudayan)	Rh	Astringent, fevers, dysentry ¹		-	-	-	-	-	-
RUBIACEAE									
<i>Ixora coccinea</i> L. (S : Rat-mal ; T : Vedsj)	Fl	Dysentry, stomachic, catarrh ¹		-	-	-	-	-	+
<i>Paederia foetida</i> Linn. (S : Apasu madu)	Lf, Tw	Rheumatism ³		+	-	+	+	+	-
<i>Pavetta indica</i> L. (S : Pavetta ; T : Pavattai)	Rt	Purgative, jaundice ³		+++ (3)	-	+	+	+	-

Family Botanical Names ^a (Sinhala, Tamil names)	Reported Medicinal Plant Part(s)		Screening results ^c				
	Uses	Used ^b	Alkaloids (No. of alkaloids by t. l. c.) ^d	Saponins	Steroids/terpenoids	Cardiac Glycosides	Flavonoids
<i>Randia dumetorum</i> Lam. (S : Kukurman ; T : Karai)	Emetic, diaphoretic, antispasmodic, nut, bruised and thrown into pools, intoxicates fish ³	Fr	—	+	+	—	+
<i>Rubia cordifolia</i> L. (S: Welmadata; T: Manjidi)	Diuretic, emmenagogue, jaundice ³	Tw, St	+	—	+	+	—
RUTACEAE <i>Aegle marmelos</i> (L.) Corr. (S : Neli ; T : Vilvum)	Chronic bronchitis, asthma, scabies, skin complaints ^{3,4}	Rt	+++ (4)	—	+	—	—
SANTALACEAE <i>Santalum album</i> L. (S : Sudu handun ; T : Senthanam)	Pimples-local application ^e	Tm	—	—	—	—	—
SAPINDACEAE <i>Cardiospermum halicacabum</i> L. (S : Wel-penela ; T : Mudakatran)		Lf, Tw	+	—	+	—	+
<i>Sapindus emarginatus</i> Vahl ² (S : Penela ; T : Ponnankottai)	Hot and alexipharmic, anthelmintic, diarrhoea and cholera ³		—	+	+	+	—
<i>Sapindus trifoliatius</i> L. ³							
SCROPHULARIACEAE <i>Bacopa monniera</i> (L.) Wettst. (S : Lunuwila ; T : Neerpirami)	Diuretic, ¹ bowels and skin eruptions	Wp	—	+	+	—	—

<i>Picrorhiza kurroa</i> (S : Katu karosana)	Tw	+++ (2)	-	+	-	+
SAPOTACEAE						
<i>Madhuca longifolia</i> (L.) J. F. Macbr. (S : Mec ; T : Iluppai)		-	+	+	+	+
<i>Mimusops elengi</i> L. (S : Muna-mal ; T : Magil)		++ (7)	-	+	-	+
SIMAROUBACEAE						
<i>Samadera indica</i> Gaertn. (S : Samadera ; T : Neepa)	Fr	+	+	+	-	-
SOLANACEAE						
<i>Solanum jacquini</i> Thw. (S : Katuwel-batu ; T : Kandakantiri)	St, Fr	++ (3)	-	+	-	-
<i>Solanum trilobatum</i> L. (S : Wel-tibbatu ; T : Thothuralai)	St, Fr	++ (3)	+	+	-	-
<i>Solanum xanthiocarpum</i> Schrad. (S : Elabatu ; T : Vattu)	Rt	++	-	-	-	+
UMBELLIFERAE						
<i>Anethum graveolens</i> L. (S : Satakuppa ; T : Satakuppkirai)	Sd	++ (2)	-	+	-	+
<i>Corianthrum sativum</i> L. (S : Kottamalli ; T : Kottamalli)	Sd	+	-	-	-	+

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<i>Botanical Names^a</i> (Sinhala, Tamil names)						
<i>Trachyspermum roxburghianum</i> (DC.) Craib (S : Asamodagam ; T : Omum)	Diarrhoea, carminative ³	Fr	—	—	—	+
URTICACEAE						
<i>Fleurya interrupta</i> (L.) Wight (S : Kahambiliya)	Not recorded but produces dermatitis	If, St	+	+	—	—
VALERIANACEAE						
<i>Nardostochys jatamansi</i> (D. Don) (S : Jatamansa, D C T : Jatamanshi)	Nervine tonic, carminative rheumatism ¹	Rt	—	+	—	—
VERBENACEAE						
<i>Gmelina arborea</i> Roxb. (S : Et-demata ; T : Kamulanaram)	Rheumatism, indigestion, fever ⁴	Tm	+++ (1)	+	—	—
<i>Prenna herbacea</i> Roxb. (S : Siritekku)	Rheumatism ⁴	Rt	+(2)	+	—	+
<i>Vitex negundo</i> L. (S : Nika ; T : Mirnuchi)	Febrifuge, expectorant ¹	Rt	+	—	—	+
ZINGIBERACEAE						
<i>Zingiber officinale</i> Roscoe (S : Inguru ; T : Inji) (S : viyali inguru ; T : Sukku)	Nausea, asthma, cough, colic, palpitation of the heart ¹	Rh	++ (2)	+	—	—

ZYGOPHYLLACEAE

Tribulus terrestris L.

(S : gokatu ; T : Nerunjil)

Garcinia morella-Guttiferae)²

Urine troubles,
impotence²

+++ (2)

—

+

—

—

+

+

—

—

+

—

Tribulus terrestris L.

(S : Nerenchi ;

T : Nerenjikeorai)

Lf

Fr, Rt in

Dasamula decoction¹

(ten root decoction)

remedy for

impotence

+

—

—

—

+

—

—

No Botanical Names available

(S : Agil)

(S : Heen aratta)

(S : Kurasani)

(S : Maha-aratta)

(S : Morawessa)

(S : Thuvarala)

(S : Walangasal)

(S : Wal-anoda)

Lf, Tw

Rt

Tw, Lf

Fr

—

+

+

+

—

—

+

—

—

—

+

—

—

—

—

^a Botanical names have been obtained using the local Sinhala names following Attygalle¹, Chandrasena³ and Sultanbawa *et al*²

^b An, anthers ; Bk, stem bark ; Fl, flowers ; Fr, fruits ; Lf, leaf ; Re, resin ; Rt, root ; Rz, rhizome ; Sd, seed ; Tm ; timber ; Tw, twigs ; Wp, whole plant.

^c See experimental section for details

^d Developer solvent system—CHCl₃-MeOH (9 : 1) except for those which are marked (*) where it was CHCl₃-MeOH (19 : 1).

^e Home remedy.

Only 16 (ca 15%) plants screened were found to contain saponins and 18 (ca 17%) of them showed a positive response for cardiac glycosides. However, 62 (ca 59%) species gave a positive test for triterpenoids/steroids. Since saponins and some cardiac glycosides may answer the Liebermann-Burchardt test employed in the screening for triterpenoids/steroids, it was not possible to find out whether triterpenoids/steroids were present in addition to saponins and cardiac glycosides in samples showing positive response to this test.

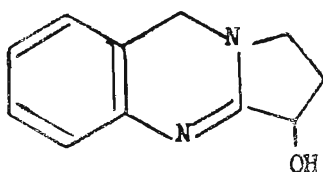
Although the value of saponins as medicinal agents is open to question, the economic importance of steroidal saponins, mainly because of their facile conversion to the medicinally useful steroid hormones is well documented^{5,11} and recognised. However, by the procedure employed in the present study the steroidal saponins could not be differentiated from the terpenoid saponins.

The importance of cardiac glycosides as medicinal agents requires no elaboration. However, there has not been much effort to seek newer and better agents of this type in the plant kingdom by means of phytochemical screening programmes. Nevertheless a few surveys have been conducted in which plant extracts were evaluated biologically for cardiotonic activity.^{16,19} In the case of cardiac glycosides, the minimum structural features required for this biological activity are so well defined that the chemical methods of detection are acceptable.⁶ There are two groups of cardiac glycosides *viz.* cardenolides and bufadienolides. Of these, the cardenolides are the most commonly encountered and most useful as therapeutic agents.

Out of the 104 samples screened, 42 (ca 40%) showed the presence of flavonoids. More than thirty three different biological activities are reported for some 30 of 137 known natural flavonoids.²⁰ These, as well as the more recent claims about the antiviral,¹⁷ anti-inflammatory,⁶ and cytotoxic properties¹⁴ of flavonoids have made it worthwhile carrying out surveys for this class of compounds. In our screening, some of the medicinal plants with alleged astringent properties showed a positive reaction to the test for flavonoids. Though tannins are known to be responsible for this property in plants, it is possible that the presence of flavonoids may also account for this property.

Five medicinal plant materials included in this survey *viz.* kotikan-bevila (*Sida rhombifolia*), atiudayan (*Aconitum heterophyllum*), sudu-handun (*Santalum album*), maha-aratha and walangasaal, showed negative responses for all the five classes of natural products. It is possible that either these classes of natural products are present in small concentrations or that their medicinal properties are due to some other classes of natural product(s).

It was stated above that a confusion exists about the botanical identification of medicinal plants sold at the drug stores. Pavetta (*Pavetta indica*) sold by Ayurvedic drug dealers was found chemically to be Adathoda (*Adathoda vasica*). To check this, a pharmacognostic investigation of the sample sold as pavetta was undertaken. The major alkaloid isolated from this was found to be vasicine (I), which compared well with the major alkaloid of *Adathoda vasica*.¹² *Pavetta indica* collected by us did not contain any vasicine and further work is in progress to isolate and identify the major alkaloids of *Pavetta indica*. Such nomenclatural confusion may exist with other medicinal plants as well. For instance, the plants sold as nerenchi and gokatu in Ayurvedic shops in one botanical assignment,² are given the same species name *viz.* *Tribulus terrestris*. A pharmacognostic study of all the Ayurvedic drugs is therefore timely.



(1)

Figure 1. VASICINE

Acknowledgements

The authors wish to thank the National Science Council of Sri Lanka for providing a grant and to Professor M. U. S. Sultanbawa for encouragement. We are grateful to Professor S. Balasubramaniam for identifying *Pavetta indica*. Technical assistance from Messrs A. S. A. Salaam, S. N. Sumanasena, and Z. A. M. Faizal is acknowledged.

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