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Chemical Investigation of Sri Lankan Plants, Part 42*
A Survey of Plants of Sri Lanka for Alkaloids. II†

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Abstract: Two hundred and fifty plant samples derived from 130 Sri Lankan plant species, including 22 endemic species were screened for the occurrence of basic and quaternary alkaloids. The plants represented 116 genera and 60 families, of which 25 were tropical families. Extractions were carried out by the HCl method, and the presence of alkaloids was detected by Mayer's and Wagner's tests. *TLC* of the crude extracts furnished the approximate number of basic alkaloids. Aqueous extracts after removing the basic alkaloids were tested for quaternary alkaloids by Mayer's test. Forty species, inclusive of 5 endemic species, gave positive Mayer's and Wagner's tests. By means of *TLC*, 63 species were found to be Dragendorff positive and 61 iodoplatinate positive. Ten species showed the presence of quaternary alkaloids. Of the plants screened for alkaloids, 52 species, distributed among 36 families, had not been previously reported in the literature, to the best of our knowledge.

1. Introduction

Amongst the natural products, alkaloids comprise the largest single class of secondary plant metabolites. Since they display dramatic physiological activities, alkaloids find wide applications in medicine; some alkaloids being toxic to man and animals. Alkaloids occur mainly in higher plants belonging to angiosperm families and are absent or infrequent in the gymnosperms, ferns, mosses and lower plants. The chemistry and pharmacology of alkaloids occurring in some plants of Sri Lanka have recently been reviewed.[24]

A search for alkaloid-containing species of vascular plants in Sri Lanka was initiated in 1973 in order to obtain fresh sources of alkaloids that could be studied chemically and pharmacologically. Since then a number of reports have appeared dealing with alkaloid screening of some plants of Annonaceae,[37] Apocynaceae,[29] 464 Sri Lankan plant species,[56,57] 100 medicinal plants,[27] 6 *Sida* species[26] and 50 medicinal plants.[7] Herein we report our results of the screening of 130 species of vascular plants for basic and quaternary alkaloids. These included 22 species endemic to Sri Lanka. Detailed chemical study of some of the alkaloid-positive species has also been undertaken.

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†For Part I, see refs. (56) and (57).

2. Experimental

2.1. Collection of Plants

Plant collections were carried out over a period of about two years beginning in 1975, from different parts of the island. As tar as possible, collections were restricted to natural habitats.

2.2. Drying of Plant Material

The plant material collected was air dried and then subjected to drying in a ventilated electrically heated dryer at approximately 50°C. In some instances undried plant material was extracted.

2.3. Preparation of Plant Extracts

The powdered dried plant material (10 g) was stirred for 24 hr with 0.1 *N* aqueous HCl (30 ml). The acidic extract was filtered through a Buchner funnel. A portion of the filtrate was tested with Mayer's and Wagner's reagents. The other portion was made alkaline with excess aqueous sodium bicarbonate and extracted with chloroform (3 × 5 ml).[14] The chloroform extract was concentrated and analysed by *TLC*.

2.4. Screening for Quaternary Alkaloids

The basified aqueous extract after extraction with chloroform was acidified with 2N HCl and tested for quaternary alkaloids with Mayer's reagent.

2.5. Preliminary Alkaloid Tests

2.5.1 *Mayer's Test* — Mayer's reagent was prepared according to Paech and Tracy.[42] A reaction which produced slight opaqueness upon the addition of Mayer's reagent was denoted as (+); if the reaction produced a definite turbidity but no precipitate, it was denoted as (++); the production of a heavy precipitate or heavy flocculation was denoted as (+++). No attempt was made to quantify the results.

2.5.2 *Wagner's Test* — Wagner's reagent was prepared by dissolving 2.0 g of potassium iodide in water (5 ml) and adding 1.27 g of iodine and diluting to 100 ml with water. The results obtained by addition of Wagner's reagent to the crude extract was recorded as for the Mayer's test. Again, no attempt was made to quantify the results.

2.6. Confirmatory test (s) and Estimation of the Probable Number of Alkaloids Present

As the use of alkaloid precipitating reagents to signify the presence of alkaloids in crude extracts has been questioned on several occasions,[19] confirmation was sought by means of *TLC*. The chloroform extracts prepared in 2.3 above were

spotted on silica gel plates (0.25 mm). The plates (5×20 cm) were developed with chloroform-methanol (9:1 or 19:1) and the spots located separately with Dragendorff's[5] and Iodoplatinate[41] reagents. Once again no attempt was made to quantify the results. However the *TLC* investigation indicated the probable number of basic alkaloidal compounds in the extract.

3. Results and Discussion

The results from testing for alkaloids in 250 samples belonging to 130 plant species, distributed over 116 genera of 60 families are presented in Table 1. In many instances leaves and twigs were screened Wherever possible, other parts, such as roots, fruits, seeds, etc. were also studied. Thirty-two plant species included in our previous survey[57] were re-examined from different localities and/or with different part (s). Preliminary tests with Mayer's and Wagner's reagents were performed on each sample. For basic alkaloids, confirmatory *TLC* analysis was carried out. For quaternary alkaloids, the aqueous solution after removing the basic alkaloids for *TLC* analysis, was acidified and tested with Mayer's reagent.

Of the 130 plant species tested, 40 gave positive Mayer's and Wagner's tests whereas 63 species showed the presence of alkaloids when sprayed with Dragendorff's reagent, and 61 showed a positive reaction to iodoplatinate spray reagent on *TLC*. These two spray reagents were used in combination since Dragendorff's[18] and iodoplatinate[25] methods have been questioned in the past, when employed separately. The following is a list of plant species containing compounds which reacted with both Dragendorff's and iodoplatinate spray reagents on *TLC* but which showed negative responses to both Mayer's and Wagner's tests: *Limnophyton obtusifolium* (Alismataceae), *Goniothalamus hookeri*, *Xylopia championii*, *X. nigricans* (Annonaceae) *Heliotropium indicum* (Boraginaceae), *Sphaeranthus indicus* (Compositae), *Bridelia moonii* (Euphorbiaceae), *Homalium zeylanicum* (Flacourtiaceae), *Uraria picta* (Leguminosae), *Scilla hyacinthina* (Liliaceae), *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia* (Malvaceae), *Ficus diversiformis* (Moraceae), *Sterlitzea reginae* (Musaceae), *Ochna squarrosa* (Ochnaceae), *Pedalium murex* (Pedaliaceae), *Clausena indica* and *Glycosmis bilocularis* (Rutaceae). Of the above species except for *Bridelia moonii*, *Pedalium murex* and *Glycosmis bilocularis*, the rest are either new records or those already known to contain alkaloids (see Table 1). Since Mayer's and Wagner's tests depend on the alkaloid concentration[57] and Dragendorff's and iodoplatinate spray reagents can give false positive results[12,18] we suggest that all these tests in combination should be used for detecting alkaloids in an extract. Out of the 130 plant species tested,10 species distributed in 7 families showed the presence of quaternary alkaloids. Of the plants screened for alkaloids, 52 species, distributed among 36 families had not been previously reported in the literature,[7–9,13,15,20,26,27,34,36,47–53,56,57,60–64] to the best of our knowledge.

TABLE 1. Results of Alkaolid Screening of Plant Samples

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk[g]	Previous work[h]
					Mayer's	Wagner's	Drg.	Ipt.		
ACANTHACEAE[b]										
Barleria prionitis L.	Sh	Naula	Waste ground	Lf	+	+	2(t)	—	—	7(+), 30(+)
				Tw	+	—	2(t)	—	—	
				Rt	—	—	—	—	—	
ALISMATACEAE										
Limnophyton obtusifolium (L.) Miq.	Hb	Kekirawa	Aquatic	Lf	—	—	2(t)	2(t)	—	None
				Rt	—	—	2(t)	2(t)	—	
				Fr	—	—	2(t)	2(t)	—	
AMARYLLIDACEAE[b]										
Crinum defixum Ker-Gawl.	Hb	Batticaloa	Marsh	Fr	+	+	2	2	—	63(i)
C. zeylanicum L. (=*C. latifolium* var. *zeylanicum* Hook. f.)	Hb	Palatupana	Coastal dune	Sd	+	+	4	4	—	17(i), 57(—) 64(i)
				Bu	+	+	8	8	—	
Zephyranthus grandiflora Lindl.	Hb	Teldeniya	Cultivated	Pl	—	—	—	—	—	None
ANACARDIACEAE[b]										
Semecarpus gardneri Thwaites	Tr	Kanneliya	Rain forest	Bk	—	—	—	—	—	None
				Lf	—	—	—	—	—	
				Tw	—	—	—	—	—	
				Tm	—	—	—	—	—	
ANCISTROCLADACEAE										
Ancistrocladus hamatus (Vhal) Gilg.[c]	Cl	Gilimale	Rain forest	Lf	+++	+++	3	3	—	22(i)
				Fr	+++	+++	4	4	—	
				Rt	+++	+++	4	4	—	

ANNONACEAE[b]										
Annona glabra L.	Sh	Peradeniya	Mangrove associate	Lf	++	+	4	4	—	57(+),59(i)
Desmos elegans (Thwaites) Safford[c]	Tr	Kanneliya	Rain forest	Bk	+	++	5	4	—	57(+)
				Tm	—	—	3(t)	3(t)	—	
Goniothalamus hookeri Thwaites[c]	Sh	Gilimale	Rain forest	Lf	—	—	2	3	—	57(+)
Mondora myristica (Gaertn.) Dun	Tr	Peradeniya	Cultivated	Sd	—	—	—	—	—	57(—)
Xylopia championii Hook.f.& Thoms.[c]	Tr	Gilimale	Rain forest	Bk	—	—	4	4	—	57(+)
Xylopia nigricans Hook.f.& Thoms.[c]	Tr	Mullativu	Monsoon forest	Tm	—	—	4	4	—	57(+)
APOCYNACEAE[b]										
Alstonia macrophylla Wall ex G. Don	Tr	Udawatta-kelle	Planted forest	Lf	+++	++	8	5	+	31(i), 35(i), 38(i), 45(i), 50(+), 63(i) 64(i)
Pagiantha dichotoma (Roxb.) Markgraf.	Tr	Badureliya	Disturbed vegetation	Lf	+++	+	10	11	+	None
				Tw	++	+	4	6	+	
Wrightia angustifolia Thwaites[c]	Tr	Anuradha-pura	Monsoon Forest	Lf	—	—	—	—	—	None
				Tw	—	—	—	—	—	
ARISTOLOCHIACEAE										
Apama siliquosa Lam	Sh	Gilimale	Rain forest	Lf	++	++	5	4	+	None
				Rt	+	+	3	3	—	
				Tw	++	++	4	4	+	
ASCLEPIADACEAE										
Brachysteima srilankana Dassanayake & Jayasuriya[e]	Hb	Dikpatana	Montane grassland	Tu	—	—	2(t)	—	—	None

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk[g]	Previous work[h]
					Mayer's	Wagner's	Drg.	Ipt.		
Cryptolepis buchananii Roem. & Schult	Cl	Batticaloa	Waste ground	Lf	—	—	—	—	—	57(+)
				Rt	—	—	—	—	—	
				Tw	—	—	—	—	—	
Cryphostegia grandiflora R.Br.	Sh	Kalpitiya	Coastal scrub	Lf	—	+	2	1	—	60(+)
				Tw	—	—	—	—	—	
Heterostemma tanjorense Wight & Arn.	Cl	Pottuvil	Coastal scrub	Lf	++	++	1	1	—	None
Tylophora flava Trim.[c]	Cl	Valaichennai	Coastal scrub	Pl	+	+	4	4	—	43(i)
BERBERIDACEAE										
Berberis tinctoria Leschen	Sh	Nuwara-Eliya	Secondary forest	Fr	+++	+++	7	7	+	24(i)
				Lf	++	++	10	8	+	
				Tw	++	++	5	5	+	
				Tm	++	++	4	4	+	
BORAGINACEAE										
Heliotropium indicum L.	Hb	Tangalle	Waste ground	Lf	—	—	4	4	—	34(+), 40(i)
				Tw	—	—	3	3	—	48(—), 61(+) 64(i)
H. scabrum Retz.	Hb	Vanathavillu	Coastal grassland	Pl	—	—	1	—	—	None
Trichodesma zeylanicum (Burm.f.)R. Br.	Hb	Puttalam	Waste ground	Pl	—	—	—	—	—	None
BURSERACEAE[b]										
Commiphora caudata (Wight & Arn) Engl.	Tr	Amparai	Monsoon forest	Bk	—	—	—	—	—	None
				Lf	—	—	—	—	—	
CAPPARIDACEAE[b]										
Crataeva religiosa Forst. f.	Tr	Karathivu	Coastal scrub	Ft	—	—	—	—	—	9(—), 15(+)
				Lf	++	++	4	4	—	47(+),48(+)
				Tw	+	++	2	2	—	50(—)

CELASTRACEAE										
Gymnosporia fruiticosa Hook.f. (=*Maytenus fruiticosa* (Thwaites) Loes)	Sh	Dikpatana	Secondary forest	Fr	—	—	—	—	—	None
Pleurostylia opposita (Wall) Alston	Tr	Amaduwa	Coastal dune	Bk	—	—	—	—	—	57(—)
COMBRETACEAE[b]										
Anogeissus latifolia (Roxb. ex DC.) Wall.	Tr	Wellawaya	Savanah	Lf	—	—	—	—	—	50(—)
				Rt	—	—	—	—	—	
				Tw	—	—	—	—	—	
Terminalia bellirica (Gaertn.) Roxb.	Tr	Peradeniya	Cultivated	Sd	—	—	—	—	—	7(+), 20(—) 34 (—)
Terminalia chebula Retz.	Tr	Peradeniya	Cultivated	Sd	—	—	—	—	—	7(+), 50(—)
COMPOSITAE										
Sphaeranthus indicus L.	Hb	Kekirawa	Waste ground	Pl	—	—	3(t)	3(t)	—	31(i), 57(—)
				Rt	—	—	2(t)	2(t)	—	63(i)
Xanthium strumarium L.	Hb	Kekirawa	Waste ground	Rt	—	—	—	—	—	8(+), 9(+) 48(+), 64(i)
CONNARACEAE[b]										
Connarus monocarpa L.	Cl	Vanatha-villu	Coastal scrub	Fr	—	—	—	—	—	57(—)
CONVOLVULACEAE										
Argyreia osyrensis (Roth) Choisy (=*Lettsomia aggregata* Roxb.)	Cl	Naula	Secondary vegetation	Rt	—	—	—	—	—	64(i)
Ipomoea cairica (L.) Sweet	Cl	Dehiowita	Waste ground	Pl	—	—	—	—	—	8(—), 47(+)
Merremia tridentata (L.) Hallier f. (=*Ipomoea tridendata* Roth.)	Cl	Mannar	Waste ground	Pl	—	—	1(t)	—	—	None

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk.[g]	Previous work[h]
					Mayer's	Wagner's	Drg.	Ipt.		
CUCURBITACEAE[b]										
Bryonopsis laciniosa (L.) Naud.	Cl	Anuradha-pura	Secondary vegetation	Fr	—	—	—	—	—	20(—), 47(—) 60(+)
DILLENIACEAE										
Tetracera sarmentosa (L.) Vahl (=*T. scandens* Sensu Alston)	Cl	Gilimale	Disturbed rain forest	Lf	++	+	2	3	—	8(—),9(—)
				Tw	—	—	—	—	—	34(—)
DIPTEROCARPACEAE										
Dipterocarpus glandulosus Thwaites[c]	Tr	Kanneliya	Rain forest	Bk	—	—	—	—	—	57(—)
				Tm	—	—	—	—	—	
Hopea jucunda Thwaites sub sp. *modesta*[c]	Tr	Kanneliya	Rain forest	Bk	—	—	—	—	—	57 (—)
				Tm	—	—	—	—	—	
Shorea affinis Thwaites	Tr	Kanneliya	Rain forest	Tm	—	—	—	—	—	None
Vateria copallifera (Retz.) Alston[c]	Tr	Kanneliya	Rain forest	Bk	—	—	—	—	—	57 (—)
EUPHORBIACEAE										
Agrostistachys hookeri (Thwaites) Hook. f.[c]	Tl	Kanneliya	Rain forest	Bk	—	—	—	—	—	57 (—)
				Fr	—	—	—	—	—	
				Lf	—	—	—	—	—	
				Tw	—	—	—	—	—	
				Tm	—	—	2	(t)	—	

Aporosa cardiosperma (Gaertn.)Merr.[c]	Tr	Kanneliya	Rain forest	Bk	—	—	—	—	—	57 (—)
				Lf	—	—	—	—	—	
				Tw	—	—	—	—	—	
				Tm	—	—	—	—	—	
Bridelia moonii Thwaites[c]	Tr	Kanneliya	Rain forest	Bk	—	—	2(t)	2(t)	—	57 (—)
				Lf	—	—	1	1	—	
				Tw	—	—	1(t)	1	—	
				Tm	—	—	1(t)	1(t)	—	
				Rt	—	—	1	1	—	
Croton sparsiflorus Morong	Hb	Tangalle	Waste ground	Lf	+++	+	3	2	+	6(+), 44 (i) 64 (i)
				Rt	—	—	—	—	—	
				Tw	++	+	2	2	+	
Croton tiglium L.	Hb	Peradeniya	Cultivated	Sd	—	—	—	—	—	7(+), 9 (—) 57 (—), 60(+) 63(i)
Glochidion moonii Thwaites[c]	Tr	Upper Hantane	Disturbed Montane forest	St	—	—	—	—	—	None
Mischodon zeylanicus Thwaites	Tr	Puttalam	Monsoon forest	Lf	—	—	—	—	—	None
				Tw	—	—	—	—	—	
Phyllanthus polyphallus Willd.	Sh	Batticaloa	Waste ground	Lf	—	—	—	—	—	None
				Tw	—	—	—	—	—	
Podadenia thwaitesii (Baill.) Muell. Arg.[c]	Tr	Kanneliya	Rain forest	Bk	—	—	—	—	—	None
				Lf	—	—	—	—	—	
				Tw	—	—	—	—	—	
Sapium indicum Willd.	Tr	Nagoda	Secondary vegetation	Bk	—	—	—	4(t)	—	57 (—)
				Fr	+	+	2(t)	5	—	
FLACOURTIACEAE										
Homalium zeylanicum (Gardn.)Benth	Tr	Gilimale	Rain forest	Lf	—	—	—	—	—	None
				Rt	—	—	—	—	—	
				Tw	—	—	1	1	—	

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk[g]	previous work[h]
					Mayer's	Wagner's	Drg.	Ipt.		
HYDROCHARITACEAE										
Ottelia alismoides (L.) Pers.	Hb	Kekirawa	Aquatic	Pl	—	—	—	—	—	None
HYDROPHYLLACEAE										
Hydrolea zeylanica (L.) Vahl.	Hb	Kekirawa	Marsh	Lf	++	+	—	3(t)	—	None
				St	++	—	4(t)	3(t)	—	
HYPOXIDACEAE										
Curculigo orchiodes Gaertn.	Hb	Puttalam	Coastal grassland	Pl	—	—	—	—	—	None
LABIATAE										
Leonotis nepetifolia (L.) Ait. f.	Hb	Naula	Waste ground	Pl	—	—	—	—	—	64(+)
LAURACEAE										
Cryptocarya wightiana Thwaites	Tr	Kanneliya	Rain forest	Lf	—	—	—	2(t)	—	57(+)
				Tw	—	—	—	—	—	
Neolitsea fuscata (Thwaites)Alston[c]	Tr	Nuwara Eliya	Montane forest	Tm	+	+	3	3	—	28(i), 57(+)
LEGUMINOSAE										
Caesalpinia bonducella (L.) Roxb	Cl	Kalkudah	Coastal scrub	Lf	—	—	—	—	—	20(—), 62(+)
				Tw	—	—	—	—	—	63(+)
Caesalpinia bonducella (L.) Roxb.	Cl	Tangalle	Coastal scrub	Lf	—	—	(t)	(t)	—	None
				Tw	—	—	—	—	—	

Caesalpinia sappan L.	Tr	Peradeniya	Cultivated	Lf	—	—	(t)	(t)	—	51(—)
				Tw	—	—	(t)	(t)	—	
				Rt	—	—	—	—	—	
Crotolaria juncea L.	Hb	Peradeniya	Cultivated	Sd	++	++	2	3	—	4 (i), 64 (i)
Crotolaria verrucosa L.	Hb	Pottuvil	Coastal Dune	Sd	++	++	2	2	+	7(+), 34(—), 55 (i), 58 (i), 61(+), 64(i)
Dalhergia lanceolaria L.f.	Tr	Habarana	Wayside	Pd	—	—	3	—	—	None
Desmodium triquetrum (L.) DC.	Hb	Gilimale	Disturbed area	Lf	—	—	—	—	—	8(+), 64(+)
				Tw	—	—	—		—	
Erythrina constantiana Michelli	Tr	Peradeniya	Cultivated	Lf	+++	+	5	5	—	57(+)
				Tw	+++	+	5	5	—	
Erythrina lysistemon Hutchinson	Tr	Peradeniya	Cultivated	Lf	+++	+	4	4	—	12(i), 57(+)
				Tw	+++	+	5	5	—	
Phaseolus lathyroides L.	Hb	Anuradha-pura	Waste ground	Lf	—	—	—	—	—	None
				Tw	—	—	—	—	—	
Pterocarpus indicus Willd.	Tr	Peradeniya	Cultivated	Sd	—	—	—	—	—	9(—), 34(+), 64(+)
Sophoria tomentosa L.	Sh	Kalkudah	Coastal scrub	Lf	++	++	2	—	—	9(+)
				Tw	++	++	10	8	—	
Tephrosia maxima (L.) Pers.	Hb	Tangalle	Waste ground	Lf	++	++	5	5	—	34(—)
				Tw	+	+	3	3	—	
				Rt	—	—	—	—	—	
Trigonella foenum-graecum L.	Hb	Peradeniya	Purchased	Sd	—	—	—	—	—	39(i), 51(+)
Uraria picta (Jacq.) DC.	Hb	Habarana	Waste ground	Rt	—	—	2(t)	2(t)	—	None

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk.[g]	Previous work[h]
					Mayer's	Wagner's	Drg.	Ipt.		
LILIACEAE										
Dipcadi montanum (Dalz.) Baker	Hb	Dikpatana	Montane grassland	Pl	—	—	1	—	—	None
Scilla hyacinthina (Roth)J.F. Macbr.	Hb	Puttalam	Coastal grassland	Bu	—	—	5	2	—	None
LOGANIACIAEAE										
Fagraea ceilanica Thunb. (=*F. zeylanica* Thunb.)	Cl	Kanneliya	Rain forest	Fr	+	++	4	4	+	None
Fagraea obovata Wall.	Cl	Batticaloa	Monsoon forest	Lf	++	++	2	2	—	None
				Tw	+++	+++	3	3	+	
				Fr	+++	+++	6	4	+	
MALPIGHIACEAE[b]										
Hiptage benghalensis (L.) Kurz	Cl	Udawatta-kelle	Planted forest	Lf	—	—	—	—	—	51(—), 57(—)
				Tw	—	—	—	—	—	
				Rt	—	—	—	—	—	
MALVACEAE										
Hibiscus pandariformis Burm f.	Hb	Kekirawa	Fallow field	Lf	—	—	—	—	—	None
				Tw	—	—	—	—	—	
				Rt	—	—	—	—	—	
Sida acuta Burm. f.	Hb	Naula	Waste ground	Lf	—	—	2	2	—	9(+), 16(+), 23 (i), 26 (i) 61(+)
Sida acuta Burm. f.	Hb	Puttalam	Waste ground	Pl	+	++	1	1	—	
				Lf	+	+	1	1	—	
				Tw	—	—	—	—	—	

Sida acuta Burm. f.	Hb	Tangalle	Waste ground	Lf	+	+	1	1	—	
				Tw	—	—	—	—	—	
Sida cordifolia L.	Hb	Adalachinai	Waste ground	Pl	—	—	1	1	—	8(—), 16(+), 26(+), 30(—), 47(—), 61(+)
		Nochchiyagama	Waste ground	Pl	—	—	+	+	—	
		Puttalam	Waste ground	Lf	—	—	3	3	—	
				Tw	—	—	—	—	—	
Sida racemosa Burm. f.	Hb	Adalachenai	Waste ground	Pl	—	—	—	—	—	26(+)
Sida rhombifolia L.	Hb	Peradeniya	Waste ground	Lf	—	—	3(t)	3(t)	—	16(+), 20(+) 26(+), 30(—), 31(i), 34(—), 47(—), 51(—), 53(—), 63(i)
Sida rhombifolia L.	Hb	Puttalam	Waste ground	Lf	—	—	—	—	—	
				Tw	—	—	—	—	—	
				Rt	—	—	—	—	—	
Sida veronicifolia Lam.	Hb	Puttalam	Waste ground	Pl	—	—	—	—	—	16(+)
MARTYNIACEAE										
Martynia annua L.	Hb	Adalachenai	Waste ground	Rt	—	—	—	—	—	None
		Tangalle		Lf	—	—	—	—	—	
				Tw	—	—	—	—	—	
				Fr	—	—	—	—	—	
				Rt	—	—	—	—	—	
MELASTOMACEAE[b]										
Medinilla maculata Gardn.[c]	Cl	Kanneliya	Rain forest	Tu	—	—	—	—	—	None
				Pl	—	—	—	—	—	
MELIACEAE[b]										
Pseudocarpa championii (Thwaites) Hemsl.[c]	Tr	Gilimale	Rain forest	Bk	—	—	—	—	—	57(—)

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk.[g]	Previous[h] work
					Mayer's	Wagner's	Drg.	Ipt.		
MENISPERMACEAE[b]										
Tinospora malabarica (Lam.) Miers ex Hook. f. & Thoms	Cl	Anura-dhapura	Monsoon forest	Pl	+	+	—	—	+	None
MORACEAE[b]										
Artocarpus nobilis Thwaites[c]	Tr	Kanneliya	Rain forest	Bk	—	—	—	—	—	None
				Tm	—	—	—	—	—	
Ficus diversiformis Miq.	Cl	Gilimale	Rain forest	Lf	—	—	2(t)	2(t)	—	None
				Tw	—	—	—	—	—	
Ficus laevis (Miz.) King	Cl	Gilimale	Rain forest	Lf	—	—	—	—	—	
				St	—	—	—	—	—	
MUSACEAE[b]										
Sterlitzia reginae Banks	Hb	Udugama	Cultivated	Pl	—	—	1(t)	4	—	None
MYRISTICACEAE										
Horsfieldia iryaghedhi (Gaertn.) Warb.[c]	Tr	Gilimale	Rain forest	Fr	—	—	—	—	—	57(—)
MYRSINACEAE[b]										
Ardisia humilis Vahl.	Sh	Nagoda	Secondary vegetation	Lf	—	—	—	—	—	51(—)
				Tw	—	—	—	—	—	
				Tw	—	—	—	—	—	
NYCTAGINACEAE[b]										
Boerhaavia diffusa L.	Hb	Valai chenai	Waste ground	Lf	—	—	—	—	—	31(i), 63(i)
				Tw	—	—	—	—	—	48(+), 53(+)
				Rt	—	—	—	—	—	

OCHNACEAE[b]										
Ochna squarrosa L.	Tl	Padagala	Secondary vegetation	Fr	—	—	1(t)	1(t)	—	None
				Bk	—	—	—	—	—	
				Lf	—	—	—	—	—	
				Tw	—	—	—	—	—	
OLEACEAE										
Linociera zeylonica (L.) Gamble	Tl	Puttalam	Thorn scrub	Lf	+	++	3	3	—	None
				Tw	—	++	2	2	—	
OXALIDACEAE[b]										
Oxalis berelli	Hb	Gilimale	Waste ground	Pl	—	—	—	—	—	None
PANDANACEAE[b]										
Freycinetia walkeri Solms.	Cl	Gilimale	Rain forest	Pl	—	—	—	—	—	None
PAPAVARACEAE										
Argemone mexicana L.	Hb	Tangalle	Waste ground	Lf	++	+	3	2	—	21(i), 46(i)
(= *Argemone hispida* Gray)				Tw	+	+	4	3	—	48(+)
PEDALIACEAE[b]										
Pedalium murex L.	Hb	Puttalam	Coastal	Rt	—	—	5	4	—	57(—)
RUBIACEAE										
Canthium coromandelicum (Burm. f.) Alston	Sh	Vanathanimulai	Thorn scrub	Fr	—	—	—	—	—	57(-)
Gardenia fosbergii Tirv.[c]	Sh	Pethiyagoda	Disturbed vegetation	Fr	++	++	2	2	—	None
				Lf	—	—	4	2	—	
				Tw	—	—	2	2	—	
Neonauclea zeylanica (Hook.f.) Merr[c]	Tr	Nalanda	Riverine	Bk	—	—	—	—	—	None
Timonius jambosella (Gaertn.) Thwaites[c]	Tr	Kanneliya	Rain forest	Fr	—	—	—	—	—	57(—)

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk[g]	previous work[h]
					Mayer's	Wagner's	Drg.	Ipt.		
Uncaria thwaitesii (Hook.f.) Alston[c]	Cl	Kanneliya	Rain forest	Rt	+++	++	9	9	—	32(i), 33(i) 57(+)
RUTACEAE										
Clausena indica (Dalz.) oliv.	Sh	Polon-naruwa	Monsoon forest	Fr	—	—	2	2	—	None
				Sd	—	—	2	2	—	
				Lf	—	—	3	3	—	
				Tw	—	—	3	2	—	
				Bk	—	—	2	1	—	
Glycosmis bilocularis Thwaites[c]	Sh	Anura-dhapura	Monsoon forest	Lf	—	—	1	1	—	57(—)
				Tw	—	—	2(t)	2(t)	—	
				Rt	—	—	3(t)	3(t)	—	
Micromelum ceylanicum Swingle	Sh	Nikaloya	Disturbed vegetation	Lf	+	+++	4	2	—	57(+)
				Tw	+	+++	2	—	—	
Paramignya monophylla Wight	Cl	Udawatta-kelle	Planted forest	Lf	—	—	—	—	—	None
				Tw	—	—	3(t)	—	—	
SAPINDACEAE										
Lepisanthes tetraphylla (Vahl) Radlk	Tr	Amparai	Monsoon forest	Bk	++	+++	4	3	+	None
Sapindus emarginatus Vahl	Tr	Peradeniya	Cultivated	Sd	—	—	—	—	—	54(i), 57(—) 63(i)
Schleichera oleosa (Lour.) Oken.	Tr	Amparai	Monsoon forest	Bk	—	—	—	—	—	None

Thraulococcus erectus (Thwaites) Radlk	Sh	Gilimale	Rain forest	Lf Tw	— —	— —	— —	— —	— —	None
SAPOTACEAE[b]										
Madhuca longifolia (L.) J. F. Macbr	Tr	Peradeniya	Cultivated	Sd	—	—	—	—	—	7(—), 34(—)
Mimusops elengi L.	Tr	Peradeniya	Cultivated	Sd	—	—	—	—	—	7(+). 48(—)
SCROPHULARIACEAE										
Artanema longifolia (L.) Vahl.	Hb	Gilimale	Marsh	Lf Tw	++ ++	++ ++	3 3	3 3	— —	None
SIMAROUBACEAE										
Samadera indica Gaertn.	Tl	Gilimale	Rain forest	Rt	+	+	3	3	—	7(—)
SMILACACEAE										
Smilax prolifera Roxb.	Cl	Nagoda	Secondary vegetation	Pl	—	—	—	—	—	None
SOLANACEAE										
Physalis minima L.	Hb	Kanneliya	Waste ground	Pl	+	+	4	4	—	None
Solanum seaforthianum Andr.	Cl	Dambulla	Secondary vegetation	Pl Fr	++ +	++ +	1 1	1 1	— —	60(+), 61(+)
TACCACEAE[b]										
Tacca pinnatifida J. R. & G. Forst (=*T. leontopetaloides* (L.) Kuntze.)	Hb	Valai-chenai	Coastal scrub	Rh	+++	+++	1	1	—	13(+), 64(+)
VIOLACEAE										
Hybanthus enneaspermus (L.) F. Muell	Hb	Batticoloa	Waste ground	Pl	+	+	—	—	—	60(+)

Family Botanical name[a]	Habit[d]	Locality	Habitat	Plant part(s)[e]	Preliminary Alkaloid Tests		TLC[f] No. of spots		Quart. Alk.[g]	Previous work[h]
					Mayer's	Wagner's	Drg.	Ipt.		
ZINGIBERACEAE[b]										
Costus speciosus (Koen.) Sm.	Hb	Gilimale	Rain forest	Pl	—	—	—	—	—	9(—), 34(—),
				Rh	—	—	—	—	—	52(—), 57(—)
ZYGOPHYLLACEAE[b]										
Tribulus terrestis L.	Hb	Jaffna	Waste ground	Lf	—	—	—	—	—	7(+), 20(+),
				Tw	—	—	—	—	—	52(+), 60(+)

[a] Nomenclature used follows Abeywickrema,[1–3] for species indigenous to Sri Lanka. Names of cultivated species have been checked using Bailey.[10]

[b] Tropical family

[c] Species endemic to Sri Lanka.[11]

[d] *Cl*, climber; *Hb*, herb; *Sh*, shrub; *Tr*, tree; *Tl*, treelet

[e] *Bk*, stem bark; *Bu*, bulb; *Fr*, fruits; *Lf*, leaf; *Pd*, pod; *Pl*, whole plant; *Rt*, root; *Rz*, rhizome; *Sd*, seed; *Tm*, timber; *Tw*, twigs.

[f] *Drg.*, using Dragendorff's spray reagent; *Ipt.*, using iodoplatinate spray reagent; (t) traces.

[g] Quaternary alkaloids

[h] *None*, no work on alkaloids has been reported in the references cited in this paper; (+) same species reported to contain alkaloids in the accompanying reference, but no pure entities have been isolated; (—), same species investigated and found to contain no alkaloids; (i) pure alkaloid(s) have been isolated from this species according to the accompanying reference.

Table 2 summarizes the test results obtained for families containing at least one alkaloid-positive species, in which only those species giving positive response to all 4 tests are considered. The alkaloid-positive ones account for 27.7% of the total plant species screened and this is a proportion which is somewhat higher than that expected for the occurrence of alkaloids in vascular plants.[24]

TABLE 2 Summary of test results[a]

Family[b]	No. of species tested		Positive number of species[c]	
	Total	Endemic	Total	Endemic
Acanthaceae	1	0	1	0
Amaryllidaceae	3	0	2	0
Ancistrocladaceae	1	1	1	1
Annonaceae	6	4	2	1
Apocynaceae	3	1	2	0
Aristolochiaceae	1	0	1	0
Asclepiadaceae	5	2	2	1
Berberidaceae	1	0	1	0
Capparidaceae	1	0	1	0
Dilleniaceae	1	0	1	0
Euphorbiaceae	10	5	2	0
Hydrophyllaceae	1	0	1	0
Lauraceae	2	1	1	1
Leguminosae	15	0	6	0
Loganiaceae	2	0	2	0
Malvaceae	6	0	1	0
Oleaceae	1	0	1	0
Papaveraceae	1	0	1	0
Rubiaceae	5	4	2	1
Rutaceae	4	1	1	0
Sapindaceae	4	0	1	0
Scrophulariaceae	1	0	1	0
Simaroubaceae	1	0	1	0
Taccaceae	1	0	1	0

[a] Only species showing a positive response to all 4 reagents are included,

[b] Only alkaloid positive families are included,

[c] Mayer's and Wagner's positive species, clearly Dragendorff's or Iodoplatinate positive species are considered.

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