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SHORT COMMUNICATION

Alkaloids of the *Catharanthus* Species of Sri Lanka

Some preliminary studies†

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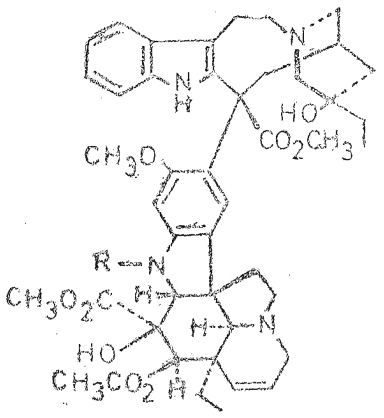
Catharanthus roseus (L) G. Don (family—Apocynaceae, *Sinhala*—Mini-mal, *Tamil*—Patti-poo, *English*—Madagascar Periwinkle) incorrectly called *Vinca rosea* is a perennial herb or subshrub endemic to Madagascar, and now widely cultivated and naturalised in many tropical countries. In Sri Lanka it is a common weed in the dry and in the wet zones at low elevations, especially on sandy soil in the coastal areas.[1] Three different forms of *C. roseus* have been reported;[4] one with white flowers and pale green stems, another form with rose pink flowers and brown stems, and a third one with pink centered white flowers and pale green stems. *C. pusillus* (Murr.) G. Don is an annual herb indigenous to Sri Lanka and India. In Sri Lanka it is a rather rare weed of cultivated land and has been recorded exclusively from Batticaloa and Jaffna districts.[5]

Catharanthus species are well known for their pharmaceutically important alkaloids.[3] Vincaleukoblastine also called vinblastine (VLB) (I), a major alkaloid of the *Catharanthus* species has been used in the treatment of lenkemia in children.[7] A minor alkaloid, leurocristine also known as vincristine (LCR) (II) from these species is more potent than VLB and fetches about US$ 400,000 per kg. in the world market.[2] Ajmalicine (AJM) (III) and vincamine (VIC) (IV) are two other useful alkaloids reported from these species.[2] Although the chemical transformation of VLB to LCR is known, *Catharanthus* species still remain the major source of these valuable alkaloids.[2] Thus, the whole plant of *C. roseus*, at present, is exported by local agents to drug manufacturers in Europe for the extraction of these alkaloids. This practise has two obvious disadvantages. Uprooting the whole plant as it is done now would probably lead to total extinction of this species from Sri Lanka.

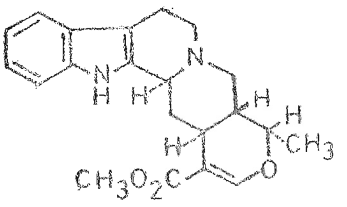
†A part of this work was presented at the 31st annual sessions of the Sri Lanka Association for the Advancement of Science, 1975.

The high freight charges paid by the local agents for sending the dried plant material to recipient countries is another disadvantage. Awareness of these prompted us to initiate work on these species with the hope of obtaining better returns from this non-traditional export. Our preliminary studies reported herein constitute an assessment of the cost of extraction of the total alkaloidal mixture using locally available solvents. A comparison of the alkaloid yields and compositions of *C. roseus* (all three forms) and those of *C. pusillus* has also been made.

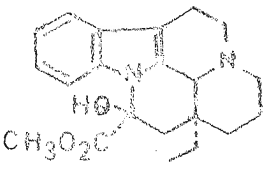


(I) R = CH_3 ; VLB

(II) R = CHO ; LCR



(III) ; AJM



(IV) ; VIC

Different parts of the plants were subjected to separate small scale extractions with chloroform and methanol. TLC examination of the crude extracts thus obtained revealed that the pharmaceutically useful alkaloid VLB could be effectively extracted with either solvent. Methanol was preferred for large scale extractions as it is cheaper. However, for the extraction of the less polar alkaloids such as AJM, chloroform was found to be a better solvent. The leaves of the three forms of *C. roseus* had a similar alkaloid composition except that the form with rose pink flowers had a comparatively lower VLB content. The alkaloid constituents of the stems and roots of these three forms were again found to be similar. But the relative amounts of some of the alkaloids present were different. The roots of all three forms of *C. roseus* were rich in AJM and VLB, whilst their stems were relatively poor in AJM. VIC was found to be abundant in the stems of the variety with pink centered white flowers. TLC

examination of the alkaloid extract of the different parts of *C. pusillus* collected in Batticaloa showed their alkaloid constitutents to be similar. The total number of alkaloids in *C. pusillus* was found to be less than that in *C. roseus*. Therefore, further processing of the alkaloid mixture from *C. pusillus* would prove to be less difficult. However, the rareness of this species made us restrict our large scale work to the readily available *C. roseus*. The method adopted for extraction is outlined in the figure.

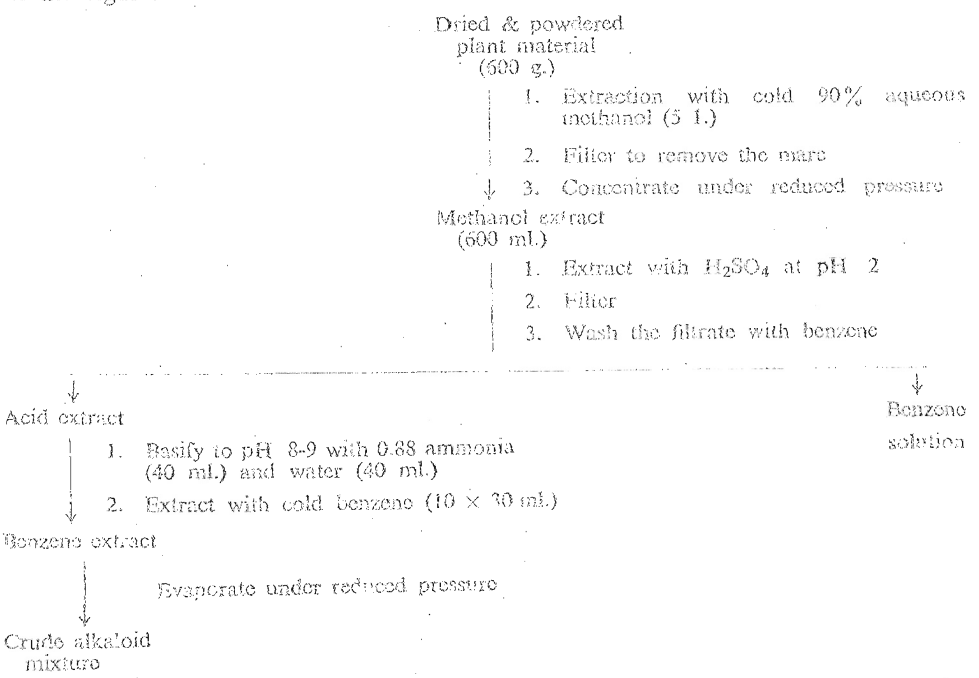


FIGURE. A typical extraction procedure of the crude alkaloid mixture from *Catharanthus* species

In one experiment 600 g. of dried leaves of the pink flowered variety yielded 2.8 g. of the crude alkaloid mixture. When 1 kg. of the stems and roots were extracted in a similar manner only 1.75 g. of the alkaloid mixture was obtained. Assessment of the cost of extraction (only for the chemicals) using locally available solvents is presented in the Table.

TABLE

Results of the large scale extractions of *C. roseus*.

Plant part(s) used	Weight	Weight of extract (% yield)	Cost of extraction	Cost/gm. of the extract
Leaves	600 g.	2.8 g. (0.47)	Rs. 1.45	Rs. 0.52
stems & roots	1 kg.	1.75 g. (0.18)	Rs. 1.92	Rs. 1.12

Our preliminary work on *C. roseus* has led to two important findings. Firstly, it is not necessary to uproot the whole plant in order to extract the pharmaceutically useful alkaloids. Instead, the plant can be cultivated and the leaves harvested at periodic intervals as a ratoon crop. However, field trials are needed before making any conclusions, especially to find out whether the alkaloid content diminishes over a period of time. Secondly, the export of the crude alkaloidal extract which could be obtained with locally available solvents would bring about a large reduction in the cost of freight.

We have extended this study to the isolation of the individual alkaloids present in the crude mixture with locally available solvents and facilities and the results of this work will be reported elsewhere.

Acknowledgement

Professor N. R. Farnsworth of the Department of Pharmacognosy and Pharmacology, University of Illinois at the Medical Centre, Chicago, is thanked for providing the authentic samples of VLB, VIC, and AJM.

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