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Pharmacognostic studies on *Pterocarpus santalinus* L.f. and *Evolvulus alsinoides* (L.)L.

By

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DECLARATION

The work described in this thesis was carried out by me under the supervision of Prof. A. M. Abeysekera (Department of Chemistry, University of Sri Jayewardenepura), Dr (Mrs.) P.L. Hettiarachchi (Department of Botany, University of Sri Jayewardenepura) and Mr. T. M. S.G. Tennakoon (Link Natural Products (Pvt) Ltd) and a report on this has not been submitted in whole or in part to any University or any other institution for other Degree / Diploma

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2009.11.10

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DECLARATION

We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation

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We certify that the candidate has incorporated all corrections, additions and amendments recommended by the examiners

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ABSTRACT

Pharmacognostic studies on *Pterocarpus santalinus* L.f. and *Evolvulus alsinoides* (L.)L.

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Pterocarpus santalinus L.f. (Fabaceae) commonly known as Rathhandun in Sinhala, is a rare and important medicinal plant. In the market, there are three red heartwoods sold as substitutes for *Pterocarpus santalinus* under the names of Rathkihiriya, Indian Rathkihiriya and Lanka Rathhandun. *Evolvulus alsinoides* (L.) L. (Convolvulaceae) commonly known as Vishnukrantiya in Sinhala, is an important medicinal plant that grows in open and grassy places. It comes to the market place in the dried form and it is often adulterated with other plant species.

The objective of the present study is to identify the morphological and anatomical characters and develop TLC methods to differentiate *Pterocarpus santalinus* and *Evolvulus alsinoides* from their adulterants found in the local market and to identify a marker compound for *Pterocarpus santalinus* in one of its major preparations, Desandunkalkaya.

Microscopic features such as arrangement of vessels, vessel deposits, axial parenchyma and ray parenchyma of wood in Indian Rathkihiriya were found to be identical with authentic *Pterocarpus santalinus* , while above features observed in Lanka Rathhandun and Rathkihiriya were identical with those of *Myroxylon balsamum*. The chromatograms of *Pterocarpus santalinus* and Indian Rathkihiriya were observed to be similar to each other, and could be easily differentiated from Lanka Rathhadun and Rathkiriya, which

were similar to each other. Therefore, based on the results of microscopic analysis and TLC analysis, samples sold in the crude drug market as Indian Rathkihiriya was identified as *Pterocarpus santalinus*. Similarly Lanka Rathhadun and Rathkihiriya were identified as *Myroxylon balsamum*

Pterocarpol, which was identified as a marker compound for *Pterocarpus santalinus*, can be used to distinguish *Pterocarpus santalinus* from its adulterants. It can be observed clearly as blue spot at R_f 0.6 (Silica / chloroform: methanol (20:1)), when sprayed with anisaldehyde / sulphuric acid reagent. This was identified as pterocarpol by Mass spectroscopy, ^{1}H and ^{13}C NMR spectroscopy. A precise, accurate, simple, and a rapid method for determination of pterocarpol content by TLC-VIS densitometric was developed. The precision was 1.513 CV and recoveries of 96-104% were recorded in standard addition recovery experiment. Pterocarpol content of 0.06% may be recommended as a provisional standard for Desandunkalkaya.

Two species, *Gonigyna hirta* (Wild) Ali. and *Crotalaria prostrata* Roxb. were found as adulterants of *Evolvulus alsinoides* market samples. Those were differentiated using characters of stem (trichome), leaf (apex, base, trichome), flower (corolla shape), inflorescence (type) and fruit (type). They were stable even in the dried form. Those characters were selected out of 72 characters taken for the study. Scopoletine and umbelliferone, which were isolated from *Evolvulus alsinoides* were not present in the methanol extract of the adulterants. Apart form these two compounds, caffeic acid was isolated from *Evolvulus alsinoides.*

All *Evolvulus alsinoides* sample could be categorized basically into two types as type A and B based on the leaf shape and the habit. Type A, which is generally found in the dry

zone, has Linear-oblong shape of leaf, while type B, has Oblong shape of leaf. Type A corresponds to the previously described *Evolvulus alsinoides var. alsinoides* and type B tallies with *Evolvulus alsinoides var. hirsutus.*

Polythetic keys were developed to identify varieties of *Evolvulus alsinoides* and also to differentiate *Pterocarpus santalinus* from its adulterant *Myroxylon balsamum.*