

**Pharmacognostic studies on 'Jatamansa' used in Ayurveda and
exploring the possibility of substituting *Nardostachys grandiflora*
DC. with *Valeriana* spp. recorded in Sri Lanka**

BY

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**Thesis submitted to the university of Sri Jayewardenepura for
the award of the Degree of Master of Philosophy in Botany**

I/we certify that by the candidate has incorporated all corrections, additions and amendments recommended by the examiners.

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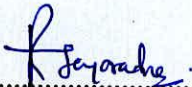
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DECLARATION

The work described in this thesis was carried out by me under the supervision of Dr. P.L. Hettiarachchi, Prof. A. M. Abeysekera, Mrs. S.S. Sugathadasa and Prof. P.A.J. Yapa, a report on this has not been submitted in whole or in part to any university for any other degree/Diploma.


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my loving parents, beloved teachers, husband and kids*

Who are

*Not only in my family nest
But gave me their very best
And vouched not to be at rest
Until I reach the academic crest*

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R.K. Jayaratne

ABSTRACT

'Jatamansa' is an important raw material used in the Ayurvedic system of medicine. It is considered as one of the controversial drugs in Ayurveda. According to Ayurvedic Pharmacopoeia of India, rhizome of *Nardostachys grandiflora* DC. (Caprifoliaceae) is the official part for Jatamansa and *Valerina wallichii* is the official substitute for Jatamansa. A market survey carried out during the present study revealed that the subterranean part of *Balanophra fungosa* J.R. & Forst. (Balanophoraceae) which is listed as a threatened species, is extensively used as 'Jatamansa' in Sri Lanka. *Valeriana mooni* Arn. and *Valeriana wallichii* DC. belonging to the same family as *N. grandiflora* could be grown successfully in our country and hence might be better substitutes for authentic 'Jatamansa' in Ayurvedic preparations. Therefore this study was designed to carry out a comparative pharmacognostic evaluation of those four plant species.

The market survey was carried out by purchasing samples from the market as well as by collecting responses of dealers and traditional Ayurvedic physicians to a structured questionnaire. Pharmacognostic evaluation was carried out by morphological (both macroscopic, microscopic) studies, organoleptic studies, preliminary phytochemical

evaluation (phytochemical analysis, physiochemical studies, fluorescence analysis), TLC and GCMS analysis.

In the market survey, based on raw material collection it was revealed that only 20% of the raw material dealers and according to the questionnaire survey 26% of the raw material dealers and 34% of traditional physicians use *N. grandiflora* as 'Jatamansa'.

In the pharmacognostic evaluation, considering their morphology and organolepticity, there are many characters which could be used to differentiate *N. grandiflora* from *B. fungosa*. Fibrous rhizome of *N. grandiflora* with distinct aromatic smell is entirely different from *B. fungosa* which has non fibrous tubers with warty surface and wax filled internal tissues. Multi layered cork, stellate interxylary and medullary cork layers, fragmented cortex and schizogenous cavities are unique anatomical features that can be used to differentiate *N. grandiflora* from *B. fungosa* which has a single cork layer and compact cortex with irregularly embedded vascular cylinders called composite bundles. Morphologically and anatomically *N. grandiflora* could be easily differentiated from *Valeriana* spp. tested, by having above characteristic features present in *N. grandiflora*. The only significant anatomical difference observed between *V. mooni* and *V. wallichii* is the presence of lacunar pith in *V. wallichii* instead of compact pith in *V. mooni*. Preliminary phytochemical analysis indicated the presence of alkaloids, and hydrolysable tannins in all tested samples while condensed tannins, saponins and reducing sugars were not detected in any of them. *B. fungosa* differs from *N. grandiflora* due to the presence of steroids and fixed oil, which are absent in *N. grandiflora*. Fluorescence analysis cannot be used as a quality parameter to differentiate these raw materials significantly, though some

minor differences were detected. Chromatographic studies including TLC and GCMS analysis showed that, extracts of *N. grandiflora*, *V. mooni* and *V. wallichii* contained similar chemical compounds which were not observed in *B. fungosa*. Several medicinally important phytochemicals were detected for the first time for *B. fungosa* and *V. mooni* in the GCMS analysis. Considering GCMS profiles, it was found that *N. grandiflora*, *V. mooni* and *V. wallichii* are rich with sesquiterpenes whereas organic fatty acids are abundant in *B. fungosa*. Jatamansone which has number of pharmacological actions and was recorded as the principal sesquiterpene in jatamansi oil could be detected in essential oil of *N. grandiflora* (8.9%). Jatamansone is found in *V. mooni* (25.6%) and *V. wallichii* (18.4%) in considerable amount, but *B. fungosa* lacks Jatamansone. This study indicates that two *Valeriana* spp. found in Sri Lanka seem to be suitable substitutes for *N. grandiflora*, than the most commonly used *B. fungosa*.