

**Physico-chemical parameters,  
Anti-oxidant activity and Cosmetic  
applications of *Tamarindus indica***

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M.Sc

2010

**Physico-chemical parameters, Anti-oxidant activity and  
Cosmetic applications of *Tamarindus indica***

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Thesis submitted to the University of Sri Jayawardenepura in  
partial fulfillment of the requirement for the award of the Master  
of Science in Industrial Utilization of Medicinal and Aromatic  
plants.

## DECLARATION

The work described in this thesis was carried out by me under the supervision of Dr. Radhika Samarasekare (Senior Research Officer, Herbal Technology Section, Industrial Technology Institute, Colombo) and under the coordination of Dr. C. Mahathanthila (Department of Chemistry, University of Sri Jayawardenapura) and a report on this has not been submitted in whole or in part to any university or any other institution for another Degree.

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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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## List of Abbreviations

SLS	Sri Lanka Standards
GAE	Gallic acid equivalent
DCPIP	2, 6-dichlorophenol-indophenol
DPPH	1,1-diphenyl-2-picrylhydrazyl
BHT	butylated hydroxy toluene
BHA	butylated hydroxyl anisole
TBHQ	tertiary butyl hydroquinone
ORAC	oxygen radical absorbance capacity
TRAP	total radical- trapping anti-oxidant parameter
ABST	2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid)
AEAC	L-ascorbic acid-equivalent antioxidant capacity
AHA	$\alpha$ -hydroxyl acids
TBA	Thiobarbituric acid
HDL	High-density lipoproteins
LDL	Low-density lipoproteins
VLDL	Very-low density lipoproteins
HPO <sub>3</sub>	Metaphosphoric acid

## **Acknowledgement**

First and foremost I would like to express my most sincere gratitude to my research supervisor Dr. (Mrs.) Radhika Samarasekare at Industrial Technology Institute (ITI) for her noble supervision, encouragement and constructive criticism throughout the research project and also in preparation and painful editorial work of the thesis.

I also like to express my sincere gratitude to Dr. (Mrs.) C. Mahathanthila at University of Sri Jayawardenepura for her guidance and advice throughout the research project.

Thanks and praise must also go to Dr. A.M. Mubarak, the Director of ITI for granting me permission to carry out my project at ITI. I wish to thank Mr. Colin Peiris, Mrs. K. Abesekare for all the help given to me throughout the study. My special thanks go to all the members of the staff of Herbal Technology Section, ITI for their numerous support.

My heartiest thanks and gratitude go to my parents, brother and sister in law for their encouragement and financial support during my M. Sc. project. I wish to thank my colleagues and others who supported in numerous ways to make my research project a success.

## **CHAPTER 1**

### **1.0 INTRODUCTION**

#### **1.1 General Introduction**

Use of natural plants as primary health remedies, due to their pharmacological properties is quite common worldwide. Drug discovery from plants has been a goal of mankind since prehistoric times<sup>1</sup>. In recent years pharmaceutical as well as cosmeceutical companies have spent a lot of time and money in developing natural products extracted from plants, to produce more cost effective remedies that are affordable to the population. Limitations of synthesized compounds and the potential of plant-based medicine and cosmetics as a more effective and cheaper alternative, was probably responsible for the fast growing industry of herbal medicine<sup>1</sup>.

Sri Lanka, because of its geographical location and its physical features, has relatively a wide range of climatic regions and a correspondingly rich varied flora, fauna and microbes. Sri Lanka is rich in its natural vegetation and is considered one of the twenty five “Biological Hot Spots” in the world. The genetic diversity of flowering plants in Sri Lanka is reflected by 1369 genera, 3771 species, 926 endemics, 499 exotics with 28% endemism<sup>2</sup>. A major part of our genetic materials are still untapped and no systematic scientific research programme has yet been made by local researchers to isolate these genetic materials. What we know about them comes mainly from the accumulated traditional knowledge.

It is well established that natural products including plants could continue to provide mankind with valuable therapeutic and cosmetic agents and tremendous variety of lead structures for cosmetic and drug development, although fewer reports are available on

certain plant species concerning biological activities<sup>3,4</sup>. Naturals are the cheapest and richest sources of bioactive ingredients. Herbs with medicinal properties contain a variety of different nutritious and therapeutic constituents. Fruit crops are capable of giving higher production and calorific value per unit area than other botanicals. The consumption of fruits is therefore equally important for all the segments of the society especially in terms of malnutrition<sup>5</sup>. Besides the major fruit crops grown in Sri Lanka such as banana, mango, avocado and rambutan, there are also a large number of underutilized fruit species growing naturally in various parts of the country. These are fruit species with under-exploited potential for contribution to food, health and nutritional industry, income generation and environmental services<sup>6</sup>. The commonly grown underutilized fruits in Sri Lanka<sup>5</sup> are jackfruit (*Artocarpus heterophyllus* lam.), tamarind (*T. indica*), wood apple (*Limonia acidissima* L.), nelli (*Phyllanthus embilica* L.), beli (*Aegle mermelos* L.), annonas (*Anona* spp.) and mangosteen (*Garcinia mangostana* L.). There are also many other species that grow in homegardens, wastelands and in the wild, which could be a good source for a number of benefits, particularly to the rural communities.

Many of the underutilized fruit species i.e. nelli, tamarind, beli and annonas have known medicinal properties, and have been used in traditional medicine and Ayurveda. These species have tremendous healing powers and provide opportunities for development of standard and safe herbal medicines at low cost<sup>5</sup>. Most of these underutilized fruits are underexploited, but produce a large quantity of fruits during the season. The loss of underutilized species has to be prevented and collection and appropriate conservation systems to be developed for preserving this valuable wealth through domestication<sup>6</sup>.