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## Determination of Nutraceuticals in Tropical Medicinal Plants of *Syzygium jambos* L. (Alston) and *Syzygium travancoricum* Gamble

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### Abstract

To determine the biochemical compounds, carbohydrates, proteins, total fat and crude fiber, free amino acids, free fatty acids, minerals, calcium, iron, potassium, sodium, magnesium, phosphorus, trace elements, thiamine, niacin, riboflavin, vitamin-E, vitamin- C, and heavy metals lead (Pb), copper (Cu), cadmium (Cd), molybdenum (Mo), aluminium (Al), and zinc (Zn) in a two tropical medicinal plants *Syzygium jambos* and *Syzygium travancoricum*. UV spectrophotometer, Atomic absorption spectrophotometer these instruments are used to determine the elements. These elements contents in the medicinal plants of *Syzygium* species are at different levels. Plants are rich in some essential elements, which is very useful in human beings and very least in heavy metals.

**Keywords:** Nutraceuticals, minerals, heavy metals, *Syzygium jambos* and *Syzygium travancoricum*

### 1. Introduction

Nutraceuticals are "naturally derived bioactive compounds that are found in foods, dietary supplements and herbal products, and have health promoting, disease preventing and medicinal properties." Plant derived Nutraceuticals/functional foods have received considerable attention because of their presumed safety and potential nutritional and therapeutic effects [1]. India has a rich culture of medicinal herbs and spices, which includes about more than 2000 species and has a vast geographical area with high potential abilities for Ayurveda, Unani, Siddha traditional medicines but only very few have been studied chemically and pharmacologically for their potential medicinal value. Starting from the ancient time, medicinal plants have been used to prevent and treat various health problems. Plants are still an independent source of medication in the contemporary health care delivery system. Their role is twofold in the development of medicines and served as a natural blue print for the development of new drugs.

*Syzygium jambos* L. (Alston) and *Syzygium travancoricum* Gamble. The plant species are belong to the family Myrtaceae, *S. jambos* is commonly known as rose apple [2], which is widespread in sub-saharan Africa [3], Central America and Asia [4]. The plant is reported to be used for a variety of ailments and is known for its antipyretic and anti-inflammatory properties. All parts of the plant are reported to have medicinal value. The leaf decoction is used as a diuretic, a remedy for sore eyes and for rheumatism. Seeds and bark is administrated to relieve asthma, bronchitis diabetes dysentery, diarrhea and catarrh [2]. *Syzygium travancoricum* is an evergreen tree species growing up to 25 m. in height. The bark of the tree is longitudinally fissured and greyish brown in colour. Leaves are simple, petiolate and large in size. Flowers are small, bisexual and white in colour. Fruit is berry type of deep purple colour containing single seed. *S. travancoricum* is known for its medicinal value. Traditionally this plant species has been used for curing diabetes and arthritis by local people. The species is well known for its astringent, hypoglycemic, bactericidal, antifungal and neuropsychopharmacological effects. It is also source of essential oil.

In the plant kingdom there is a remedy for every disease [5]. Two hundred and fifty years ago, there was the main source of drugs for the world's population. Today, 75% of the world's population, the poor in traditional medicine [6]. Plants have provided a source of inspiration for novel drug compounds, as plant in human health and well-being [7]. The number of higher plant species (angiosperms and gymnosperms) on this planet is estimated at 250 level as high as 500,000 [8, 9]. Of these, only about 6 % have been screened for biologic activity, and a rechemical diversity of secondary plant metabolites that results from plant evolution may be equal of chemical libraries. Success in natural products research is conditioned by a careful plant selection, the data, ethnomedicinal information, field observations or even random collection.

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One main strategy in the bioactivity-guided isolation, in which pharmacological or biological assays are used to target the isolation of the work described in this dissertation is an attempt to isolate and characterize the nutritional profile of *Syzygium* sp. (Fam. Myrtaceae).

## 2. Materials and Methods

### 2. Plant materials

Leaves of *S. jambos* and *S. travancoricum* were collected from Nadugani village Gudalur, The Nilgiris, India. The plant materials were properly authenticated by Botanical Survey of India, TNAU, Coimbatore, Tamil Nadu. The collected plant species, under shade dried and grounded into powdered in 1 mm particle size using a lab mill.

### 2.1 Nutritional parameters

**Carbohydrate:** The sample extract was prepared by hydrolyzing the test sample in 2.5N HCL for three hours in boiling water bath, followed by neutralizing it with sodium carbonate. It was then centrifuged and the supernatant was collected for analysis. The analysis was carried out following method of Hedge and Hofreiter <sup>[10]</sup>.

**Protein and energy value:** Protein was estimated following the method of Lowery *et al.*, <sup>[11]</sup>.

Free amino acid <sup>[12]</sup>, Fat <sup>[13]</sup>, Fibre <sup>[14]</sup>, Cholesterol <sup>[15]</sup> were determined standard methods.

### Vitamins

Thiamine (Chaikelis, <sup>[16]</sup>), Riboflavin (Weisberg and Levin <sup>[17]</sup>), Niacin (Okwu and Josiah <sup>[18]</sup>), Vitamin E (Jayashree *et al.*, <sup>[19]</sup>), Vitamin C (Sarkiyayi and Ikioda, <sup>[20]</sup>), were determined standard methods.

### Minerals & Heavy metals

X-ray Fluorescence Spectrophotometer, Flame photometry, Atomic absorption spectroscopy were used to analyzed the mineral composition.

## 3. Results and Discussion

In the present study the leaf samples of *S. jambos* and *S. travancoricum* were collected from different agroclimatic regions of Gudalur Thaluk, The Nilgiris Districts, of Tamil Nadu, and were subjected to nutritional parameters, minerals, vitamins, and heavy metals with a view to understand the nutraceutical values.

### 3.1 Nutritional profile

The data on the nutritional parameters of the leaf samples were investigated. Among these composition protein and crude fibre content were high in both the samples (Table-1).

**Table 1:** Data on Nutritional parameters of *S. jambos* and *S. travancoricum* leaves (%)\*

S. No	Parameters	Samples-Leaves	
		<i>S. jambos</i>	<i>S. travancoricum</i>
1	Carbohydrates	38.4	28.45
2	Protein	15.6	12.06
3	Total fat	3.64	2.18
4	Crude fibre	8.35	7.26
5	Free amino acids	1.82	1.02
6	Free fatty acids	0.03	0.01
7	Cholesterol (mg/g)	0.02	0.01

\*All values are mean of triplicate determinations expressed on dry weight basis

Among the selected sample the *S. jambos* has registered the high levels of nutritional values than the *S. travancoricum* leaves. A poor diet may have an injurious impact on health, causing various ailments.

### 3.2 Minerals

The data on mineral composition of leaf samples are presented in table-2. In both the plant samples, the *S. travancoricum* has registered highest mineral content of the composition. Minerals an increase in skeletal mass and blood volume, The body needs calcium, phosphorus, and iron. Calcium intake needs to be increased to prevent osteoporosis in later life. It is present in milk and milk products, lack of iron in the diet result in anemia.

**Table 2:** Mineral Composition of *S. jambos* and *S. travancoricum* leaves (%)\*

S. No	Mineral composition	<i>S. jambos</i>	<i>S. travancoricum</i>
1	Sodium	1.62	11.62
2	Potassium	4.29	7.29
3	Iron	2.38	6.38
4	Calcium	8.33	12.33
5	Magnesium	0.96	1.96
6	Phosphorus	3.31	13.31
7	Chlorine	0.25	0.85
8	Silicon	0.37	0.67

\*All values are mean of triplicate determinations expressed on dry weight basis.

### 3.3 Vitamins

Vitamins are recognized as essential nutrients, necessary in the diet for good health. (Vitamin D is the exception it can be synthesized in the skin, in the presence of UVB radiation.) Vitamin deficiencies may result in disease conditions, including goiter, scurvy, osteoporosis, impaired immune system, disorders of cell metabolism, certain forms of cancer, symptoms of premature aging and poor psychological health (including eating disorders), among many others (Shils, <sup>[21]</sup>). Present study, among this samples, *S. travancoricum* has registered the highest levels of vitamin content, (Table-3).

**Table 3:** Vitamin content of *S. jambos* and *S. travancoricum* leaves (µg/g)\*

S. No	Vitamins	<i>S. jambos</i> -	<i>S. travancoricum</i>
1	Thiamine	10.6	13.6
2	Niacin	22.6	26.3
3	Riboflavin	89.6	59.6
4	Vitamin-E	6.09	8.09
5	Vitamin-C	4.2	15.2

\*All values are mean of triplicate determinations expressed on dry weight basis

### Heavy metals

Lead, Cadmium, Mercury, Copper, Aluminium, molybdenum were present in the sample in low detectable level.

## 4. Conclusion

*Syzygium* species are more medicinally important. Hence determination of elements in these plants is also important. This is the first report on nutritional profile, minerals, vitamins and trace elements in *Syzygium travancoricum* leaves. More advanced pharmacological and clinical studies would be required to investigate *in vivo* mechanism of nutraceutical effects of this important tropical medicinal plants.

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