International Refereed Journal of Engineering and Science (IRJES)
ISSN (Online) 2319-183X, (Print) 2319-1821
Volume 3, Issue 6 (June 2014), PP.60-63

Nutraceutical Studies in *Morinda Citrifolia* Linn Fruit

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Abstract:-Morinda citrifolia L. also known as Noni or Indian mulberry is a small evergreen tree. It is one of the most important traditional Polynesian medicinal plants. The present study is focused on Nutraceutical studies in Morinda citrifolia-fruit. The mineral analysis of macro nutrients and micronutrients were founded in M.citrifolia. The proximate analysis of ash content and crude fiber content was estimated by AOAC method and thereby the total carbohydrates and total proteins were estimated by Anthrone method and Lowry's method. Moreover the vitamin C content of the fruit extract estimated by Titration method. Finally the determination of amino acids by OPA deviation using HPLC technique was performed in the fruit. The fundamental knowledge of nutrient profile will enable further investigation in M.citrifolia.

Keywords: *Morinda Citrifolia*, Nutraceuticals, Mineral analysis, Proximate analysis, HPLC

I. INTRODUCTION

Noni (*Morinda citrifolia* Linn) commonly called as Indian Mulberry. *M.citrifolia* is used as a raw material for Nutraceuticals and functional food products. Nutraceuticals and Functional Food (NFF) products are increasingly becoming health products of choice. Nutraceuticals offers medical or health benefits to the consumer by providing means for the maintenance of health and well-being and protection from disease, on the other hand a functional food provides the body with the required amounts of vitamins, fats, protein, carbohydrates, and many other compounds that are needed for its survival (Defelice, 2002; Kalra, 2003).There are more than 120 Nutraceuticals compounds were identified in Noni (Solomon, 1999). Herbal and natural products of folk medicine have been used for centuries in every culture throughout the world (Acharya and Shrivastava, 2008). "Let food be your medicine and let medicine be your food" is world famous advice of father of medicine "Hippocrates" (Katarzyna et al., 2010). Recently Noni juice extract has been commercially processed and distributed internationally as a dietary supplement. The complete study of Nutraceutical compounds of *M.citrifolia* fruit has not yet been reported. Therefore, a broad spectrum of mineral analysis, proximate analysis and amino acids was quantified in the *M.citrifolia* fruit. The present study was undertaken to utilize *M.citrifolia* fruit for the preparation of different value added products which can be easily available at low cost of price so that all the masses can equally enjoy the medicinal benefit of this wonderful gift of nature.

II. MATERIALS AND METHODS

2.1 Collection and Identification of Plant Material

The fruits of *Morinda citrifolia* were collected during the month of March-2014 from Tamilnadu Agricultural university Botanical Garden, Coimbatore district, Tamilnadu, India. The plant was taxonomic identified and confirmed from the Botanical Survey of India, Southern Regional Centre, Coimbatore, and Tamilnadu (BSI/SRC/5/23/2013-14/Tech/2041). The fresh fruits were washed under running tap water to remove the surface pollutants and were shade dried at room temperature. Then, they were homogenized into fine powder using mixer and used for further studies.

2.2 Mineral analysis

The phosphorus content was determined using stannous method by Spectrophotometric measurements. The Sulphur content was determined using outline of the Barium chloride method. The Nitrogen content was quantified using titration after digestion whereas Calcium and Magnesium content were measured by titration procedures. The Potassium and Molybdenum content was estimated using flame photometer upon wet digestion of the sample. Amounts of the remaining mineral constituents such as manganese, iron, copper, zinc and boron were determined using an atomic absorption spectrophotometer.

2.3 Proximate analysis

The total carbohydrates and total proteins were estimated by Anthrone method and Lowry's method. Crude fiber and ash content of *M.citrifolia* fruits were estimated by AOAC methods. Moreover vitamin C was analyzed by titration method.

2.4 Amino acids

Amino acids in the fruit of *M.citrifolia* were determined by OPA deviation using HPLC technique.

III. RESULTS AND DISCUSSION

Table.3.1Mineral Content Analysis of *Morinda citrifolia*-Fruit

Sl.No	Parameters	Observation (ppm)
1	Nitrate Nitrogen	0.0807
2	Total Kjeldahl total Nitrogen	7025
3	Phosphate as PO_4	959
4	Potassium	Traces
5	Copper	0.004
6	Zinc	0.0032
7	Manganese	0.0017
8	Iron	1910.3
9	Boron	0.0011
10	Calcium	994
11	Magnesium	1219
12	Sulphur	0.056
13	Molybdenum	0.024
14	Iodine	0.032
15	Chloride	7358.8

3.1. Mineral Content Analysis of *Morinda citrifolia*-Fruit

The phosphorus content was determined using stannous method by Spectrophotometric measurements. The Sulphur content was determined using outline of the Barium chloride method. The Nitrogen content was quantified using titration after digestion whereas Calcium and Magnesium content were measured by titration procedures. The Potassium and Molybdenum content was estimated using flame photometer upon wet digestion of the sample. Amounts of the remaining mineral constituents such as manganese, iron, copper, zinc and boron were determined using an atomic absorption spectrophotometer.

Nitrate nitrogen and total kjeldhal total nitrogen was found to be 0.0807 and 7025 ppm, respectively. Chloride was found in higher amounts compared to other nutrient minerals (7358.8 ppm). Iron, magnesium, calcium and phosphate as PO_4 were found to be in appreciable quantities such as 1910.3, 1219, 994 and 959 ppm, respectively. The other mineral nutrients were present in low quantities and potassium in traces.

Table.3.2 Proximate Chemical Composition Analysis of *Morinda citrifolia*-Fruit

Sl.No	Parameter (content)	Observation
1	Total carbohydrates (g/100g)	25.94
2	Total proteins (g/100g)	4.37
3	Crude fiber (%)	10.46
4	Ash (%)	5.78
5	Vitamin C (%)	12.61

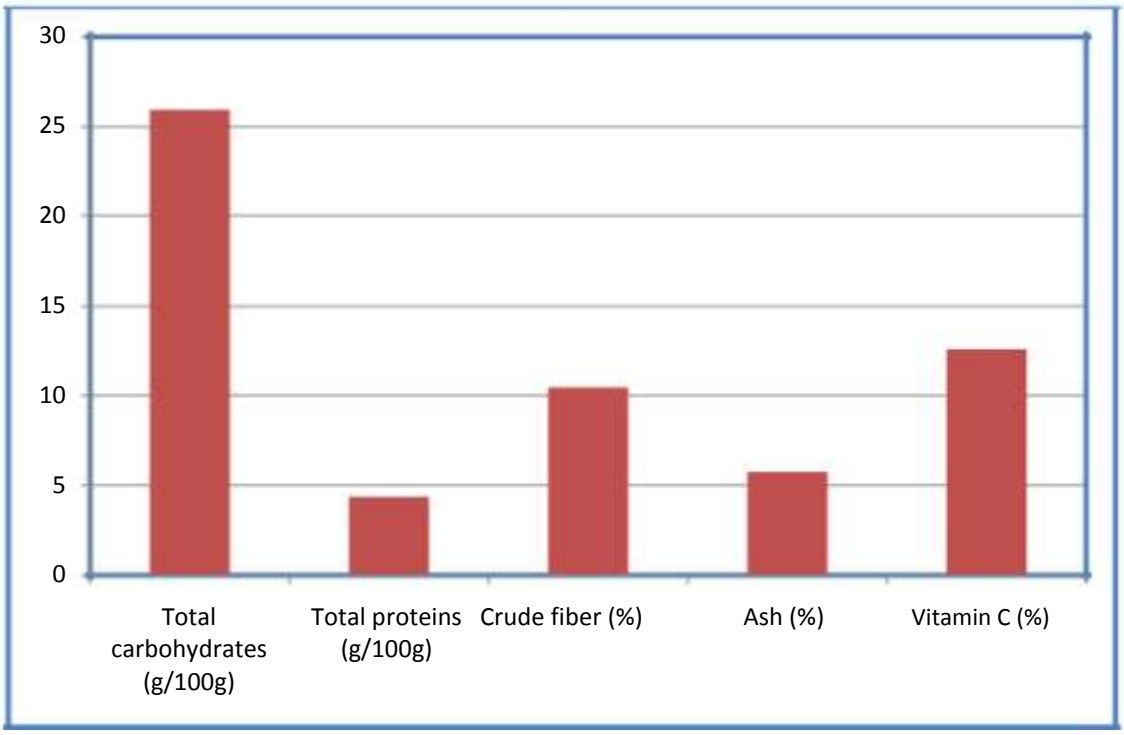

Fig.1. Proximate Chemical Composition Analysis of *Morinda citrifolia*-Fruit

3.2. Proximate Chemical Composition Analysis of *Morinda citrifolia*-Fruit

The total carbohydrates and total proteins were estimated by Anthrone method and Lowry's method. Crude fiber and ash content of *M.citrifolia* fruits were estimated by AOAC methods respectively. Moreover vitamin C was analyzed by titration method. The total carbohydrates and total proteins were presented in quantities such as 25.94 and 4.37 g/100g dried powder, respectively. Moreover, vitamins C, crude fiber and ash content were found to be 12.61, 10.46 and 5.78, respectively of 100% dried powder of *M.citrifolia* fruits.

Table.3.3 Amino Acids Content Analysis of *Morinda citrifolia*-Fruit

Sl.No	Parameter	Observation (µg/100ml)
1	Threonine	0.32
2	Cystine	0.29
3	Valine	0.76
4	Methionine	0.084
5	Isoleucine	0.99
6	Leucine	0.50
7	Tyrosine	0.45
8	Phenyl alanine	0.61
9	Histidine	0.37
10	Lysine	0.44
11	Arginine	0.35
12	Tryphtophan	0.23
13	Proline	0.94
14	Alanine	0.78
15	Aspartic acid	0.40
16	Glutamic acid	0.88
17	Glycine	0.91
18	Glutamine	0.99
19	Aspargine	0.52
20	Serine	1.19

3.3. Amino Acids Content Analysis of *Morinda citrifolia*-Fruit

Amino acids in the fruit of M.citrifolia were determined by OPA deviation using HPLC technique. The amino acid profile substantiated that M.citrifolia fruits possess FAO/WHO/UNU required amino acids in appreciable amounts. Among the Amino Acids, Serine and Glutamine (non-essential amino acids) were found to be abundant in fruit (1.19 and 0.99 µg/10 ml protein, respectively).

Similarly, the essential amino acids Isoleucine (0.99 µg/100 ml protein), Valine (0.76 µg/100 ml of protein), Phenyl alanine (0.61 µg/100 ml of protein), leucine (0.50 µg/100 ml protein), Lysine (0.44 µg/100 ml protein), Histidine (0.37µg/100 ml protein), Arginine (0.35µg/100 ml of protein), Threonine (0.32µg/100 ml of protein) and Tryphtophan (0.23µg/100 ml of protein) were also found to be in significant amount. The other essential and non-essential amino acids were present in low quantities.

ACKNOWLEDGEMENT

I wish to express my sincere thanks to Mr. M.P. Ayyappadas Head of the Department of Biotechnology, Rathnavel Subramaniam College of Arts and Science, Sulur, Coimbatore. I owe my sincere thanks to Dr. R. Harikrishnan, Head of the Department of Biotechnology, Bharath College of Science and Management, Thanjavur. I also thank my beloved my parents, my sister's, my brother's and my uncle's for their never ending encouragement and moral support in all my endeavors.

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