



## NUTRITIONAL COMPOSITION AND IDENTIFICATION OF SOME OF THE BIOACTIVE COMPONENTS IN *MORINDA CITRIFOLIA* JUICE

SATWADHAR P. N., DESHPANDE H. W., SYED IMRAN HASHMI\* AND SYED K. A

Development of Agrobased Nutraceuticals for Health Security, Department of Food Trade and Business Management, College of Food Technology, Marathwada Agricultural University, Parbhani (MS), India. Email: imran.foodresearch@gmail.com

Received: 03 Sep 2010, Revised and Accepted: 08 Oct 2010

### ABSTRACT

Noni (*Morinda citrifolia* L.) is used to treat a wide range of maladies. Noni claimed to contains more than 160 phytochemicals. The fruit of Noni is used to prepare noni juice/extract which has got higher market potential for cure-all ailment. In present investigation, efforts were made to analyze nutritional composition and identification of some of the important phytochemical groups of the noni extract using TLC fingerprinting. The bioactive components viz. Anthraquinones, saponins and scopoletin were identified by TLC techniques and their  $R_f$  value were determined.

**Keywords:** Noni, *Morinda citrifolia*, Nutritional composition, TLC, Phytochemicals

### INTRODUCTION

Noni (*Morinda citrifolia* L.) is among the medicinal plants discovered by the ancestors of Polynesians and has been used as traditional folk medicinal plant for over 2000 years in Polynesia.<sup>1</sup> Its fruit extract is used to treat a wide range of maladies<sup>2</sup>. It traces back its history to Southeast Asia and the subcontinent and mentioned in ancient Sanskrit texts as *Ashyuka* means "longevity"<sup>3</sup>. Noni juice extracts which is obtained from Noni fruits is the most effective product that has helped relieved people from the suffering of about 22 conditions, such as arthritis, heart disease, diabetes, headache and muscle pain, high blood pressure, cancer, etc<sup>4</sup>. Recently Noni juice extract has been commercially processed and distributed internationally as a dietary supplement, there by imparting medicinal properties to consumer.

The recent use of noni as a dietary supplement has increased greatly and various research reported noni to have a broad range of therapeutic effects, including antibacterial, antiviral, antifungal, antitumor, antimutagenic, anticarcinoma, anti clastogenic, anthelmintic, analgesic, hypotensive, anti-inflammatory, LDL oxidation preventive and immune enhancing effects.<sup>4-11</sup> In order to justify the suitability of noni juice as a dietary supplement, in present investigation efforts were made to analyze physico-chemical properties, nutritional value of noni juice with TLC identification of some of the bioactive components.

### MATERIALS AND METHODS

Noni fruits were collected from University orchard (Marathwada Agricultural University, Parbhani (MS) India). The fruits were

washed, cleaned and used for the experiment. Well matured Noni fruits were kept for juice extraction. Extracted juice was filtered and used for analysis. The detailed procedure followed in Noni juice extraction is given as:

- Matured Noni fruits
- Washing with plenty of water
- Dipping in KMS solution (100 ppm) for 30 min
- Draining excess solution
- Packaging of fruit in plastic jars
- Keeping at ambient temperature for juice extraction
- Collection of juice

Prepared noni juice was analyzed for its Chemical and Nutritional composition<sup>12</sup>. Identification of characteristics bioactive components of Noni juice i.e. anthraquinones, saponins and scopoletin were obtained by TLC Methods. The  $R_f$  values of different bioactive components were examined on Silica Gel 60 plates. The chromatograms developed on the thin layer were dried and the  $R_f$  values were measured using suitable detection technique. Different chromatographic solutions or stationary phases, mobile phases and spraying reagents were prepared in accordance with the type of bioactive component<sup>13-14</sup>. The mobile phase system, spraying reagents, UV and visible detection techniques are summarized in Table-1.

Table 1: Different mobile phase system, spraying reagent, and detection by thin layer chromatographic methods<sup>13-14</sup>

Test	Extraction	Mobile phase	Spraying reagent	Detection
Anthraquinones	10 ml methanol	Ethyl acetate/Methanol/Water (100:13.5:10)	KOH reagent	Visible and UV
Saponins	10 ml methanol and extract by 1 ml water + 3ml butanol	Chloroform/Methanol/Water (64:50:10)	Vanillin-Sulfuric acid reagent	Visible
Scopoletin	5 ml methanol + 5 ml dichloromethane	Ethyl acetate/Methanol/water (100:6:4)	-	UV 366 nm

### RESULTS AND DISCUSSION

#### Nutritional and chemical properties of noni juice

The chemical composition of noni juice depends majorly upon the method of juice extraction and also on the variability in growing composition. Despite the importance of basic nutritional components, no scientific information to the best knowledge of author is available on nutritional conditions of Indian Noni juice. The nutritional composition of India Noni juice is summarized in Table-2.

Table 2: Nutritional composition of noni juice

Constituent	Percentage
Moisture (%)	91.6
Crude Protein (%)	0.39
Ash (%)	0.46
Crude fat (%)	0.14
Total carbohydrate (%)	3.84
Total dietary fiber (%)	0.72
Energy (Kcal)	154

\*Each value is average of 5 determinations

Noni juice found to contain more than 90 per cent of water while most of water in juice existed in free form. Principally, noni juice found to contain very low amount of fat and protein. With respect to nutritional value in terms of carbohydrate, protein and fat, noni juice is not a good source of basic nutrients.

**Table 3: Physicochemical properties of noni juice**

Characteristics	Values
TSS (°Brix)	8.23
pH	4.16
°Brix : acid	6.28
Acidity (%)	1.28
Reducing sugar (%)	1.34
Tannin (%)	1.20
Pectin (%)	0.44
Total phenol (%)	0.83
Ascorbic acid (mg/100ml)	32.43
Colour	10R+10.2Y+3B

\*Each value is average of 5 determinations

The physicochemical properties of noni juice were given in Table-3. The TSS of noni juice found to be 8.23°Bx while the noni juice found to

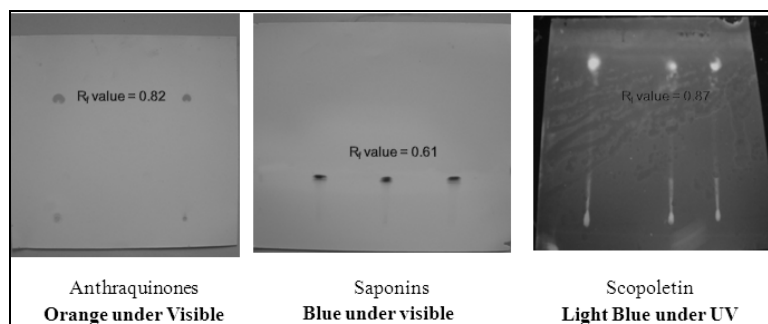
be acidic with pH 4.16. The colour value of noni juice represents darkish brown color which justify its suitable in application as a functional ingredient in beverages while the total phenol content also found 0.83 per cent which significantly imparts the antioxidant activity.

#### Identification of Bioactive components from Noni juice by TLC

Noni juice extract were ran through the Silica Gel 60 plates with the control samples so as to determine the  $R_f$  values of bioactive components. The  $R_f$  values of different components viz. anthraquinones, saponin and scopoletin were summarized in Table 4 while the chromatograms are presented in Fig-1.

**Table 4: TLC analysis for  $R_f$  value of bioactive components of Noni juice**

Bioactive Component	Chromatogram Color	$R_f$ value
Anthraquinones	Orange	0.82
Saponins	Blue	0.61
Scopoletin	Light blue	0.87



**Fig. 1: TLC chromatograms of anthraquinone, saponins and scopoletin with  $R_f$  values**

The chromatograms of the Noni juice is ascended in the form of spot and the  $R_f$  values was found be confirming the presence of anthraquinones, saponins and scopoletin. The spots are visually analyzed for its intensity of color so as to make a rough idea regarding the amount of bioactive component present. It is found that with respect to anthraquinone content,  $R_f$  value found to be 0.82, but the spots are much smaller in size. However,  $R_f$  value of saponin is found to be 0.61. Similarly, the  $R_f$  value for scopoletin content is observe i.e. 0.87. It could be said on the basis of TLC analysis that anthraquinones, scopoletin and saponins are present in Noni juice.

#### CONCLUSION

Noni juice has found to contain very low amount of protein and fat content while total carbohydrate found to be only 3.84 per cent. Hence, it is not a good source of nutrients. Noni juice is acidic in nature. With respect to studied phytochemical, it can be concluded that the bioactive components i.e. anthraquinones, saponins and scopoletin are present in Noni juice.

#### REFERENCE

- Dixon AR, McMillen H, Etkin NL. The transformation of Noni, a traditional Polynesian medicine (*Morinda citrifolia*, Rubiaceae). *Ecological Botany*, 1999; 53: 51-68.
- Ross IA. *Medical Plants of the World - Chemical Constituents, Traditional and Modern Medical Uses*. Humana Press, New Jersey; 2001.
- Kurup PNV. Ayurveda - A Potential Global Medical System. In: Laxmi C. Mishra, editor. *Scientific Basis for Ayurvedic Therapies*. Florida: CRC Press; 2003. p. 1-14
- Peter PI. Clinical research on *Morinda citrifolia* L. - Noni. *Noni Clinical Research Journal*. 2007; 1 (1, Suppl 2): 1-4.
- Furusawa E, Hirazumi A, Story S, Jensen J. Antitumor potential of a polysaccharide-rich substance from the fruit juice of

- Morinda citrifolia* (noni) on sarcoma 180 ascites tumour in mice. *Phytotherapy Research*, 2003; 17: 1158-1164.
- Hirazumi A, Furusawa E. An immunomodulatory polysaccharide- rich substance from the fruit juice of *Morinda citrifolia* (noni) with antitumour activity. *Phytotherapy Research*, 1999; 13: 380-381.
- Hornick CA, Myers A, Sadowska-Krowicka H, Anthony CT, Woltering EA. Inhibition of angiogenic initiation and disruption of newly established human vascular networks by juice from *Morinda citrifolia* (noni). *Angiogenesis*, 2003; 6: 143-149.
- Kamiya K, Tanaka Y, Endang H, Umar M, Satake T. Chemical constituents of *Morinda citrifolia* fruits inhibit copper induced low-density lipoprotein oxidation. *Journal of Agricultural and Food Chemistry*, 2004; 52: 5843-5848.
- Saludes JP, Garson MJ, Franzblau SG, Aguinaldo AM. Anti tubercular constituents from the hexane fraction of *Morinda citrifolia* Linn. (Rubiaceae). *Phytotherapy Research*, 2002. 16: 683-685.
- Yamaguchi S, Ohnishi J, Sogawa M, Maru I, Ohta Y, Tsukada Y. Inhibition of angiotensin I converting enzyme by noni (*Morinda citrifolia*) juice. *Journal of the Japanese Society for Food Science and Technology-Nippon Shokuhin Kagaku Kogaku Aishi*, 2002; 49: 624-627.
- Zin ZM, Hamid AA, Osman A, Saari N. Antioxidative activities of chromatographic fractions obtained from root, fruit and leaf of Mengkudu (*Morinda citrifolia* L.). *Food Chemistry*, 2006; 94: 169-178.
- Anonymous. *Official Methods of Analysis*. 6th ed. Washington DC: Association of Official Analytical Chemists; 1995.
- Wagner H, Bladt S. *Screening of unknown commercial drugs in: Plant drug analysis*. Springer, Germany, 1996: 349-52.
- Wagner H, Bladt S, Zgainski EM. *TLC Screening of an unknown commercial drug*. Germany: Springer-Verlag Berlin, 1993; 291-305.

