**Type: …………. [Original Research Article/ Review article/ …]**

**A comprehensive characterization and therapeutic properties in ripening Noni fruits (*Morinda citrifolia* L.)**

(Note: Should be as short as possible)

Bhanumati Sarkar1\*, Prosun Bhattacharya2, ChienYen Chen3,4, Jyoti Prakash Maity5 and Titas Biswas6

[Note: Encourage **everyone** to provide their full name (1st name, middle name & Surname), full Affiliation, e-mail address (for all authors) & orcid id (for all authors). The following link should be prepared for those authors who do not have an Orcid id: https://orcid.org/register].

1Department of Botany, Acharya Prafulla Chandra College, New Barrackpore, West Bengal, India; 2Department of Sustainable Development, Environmental Science and Engineering, KTH Royal Institute of Technology, Stockholm, Sweden; 3Department of Earth and Environmental Sciences, National Chung Cheng University, 168 University Road, Ming-Shung, Chiayi County 62102, Taiwan; 4Center for Nano Bio-Detection, Innovative Research on Aging Society, AIM-HI, National Chung Cheng University, Chiayi 62102, Taiwan; 5Environmental Science Laboratory, Department of Chemistry, School of Applied Sciences, KIIT Deemed to be University, Bhubaneswar, Odisha-751024, India; 6Department of Chemistry, Gurudas College, Kolkata-700054, West Bengal, India

***BS***, bsarkar328@gmail.com, https://orcid.org/0000-0001-9410-9311; ***PB***, prosun@kth.se, https://orcid.org/0000-0003-4350-9950, ***CYC***, chien-yen.chen@oriel.oxon.org, ***JPM***, jyoti\_maity@yahoo.com, https://orcid.org/0000-0003-4702-335X, ***TB***, titas.biswas@gmail.com, https://orcid.org/0000-0001-7926-9106

**\*Corresponding Author:** bsarkar328@gmail.com

[Note: For single author, Author’s E-mail: …………].

**Abstract:**

In this study, methanolic extracts from fresh ripening noni fruits (NFs) (*Morinda citrifolia*) were analyzed using GC-MS, FTIR, and XRD methods. Comprehensive assessments were studied by proximate analysis (PA), higher heat value (HHV), bulk density (BD) and swelling index (SI). The qualitative analysis of the ripening NFs extracts in various solvents, including distilled water, chloroform, dimethyl sulfoxide (DMSO), dimethyl formamide, and methanol, revealed positive results for starch, terpenoids, saponin, and cardiac glycosides. The percentages of volatile matter, ash content and fixed carbon in PA are 78.799±0.592, 7.18±0.044 and 14.02±0.553, respectively. To use biomass as energy, PA is essential that burns in a gaseous state (volatile matter), solid-state (fixed carbon), and inorganic waste material (ash). It is important to consider the HHV of 17.185±0.103 MJ/kg when estimating the potential for energy recovery from the fruit's biomass. Compositional analysis (CA) was used to determine the percentages of the extractive contents (4.497±0.346), cellulose (33.114±0.261), lignin (9.569±0.399), and hemicellulose (17.89±0.608), all of which have substantial antibacterial properties. Our research looked at its BD (0.312±0.001g/cm3) and SI (1.535±0.022%), resulting in increased susceptibility of the biomass to microbial activity. FTIR and XRD reveal C-O, O-H, N-H, O=C=O, C-H, and O-H linkages with solid lattice spacing. It helps to determine how a substance will interact with biological tissue following implantation. However, no research documents were found in any literature about the oil from noni fruits for the purpose of external pain relief. Advice on using NFs oil for pain treatment comes from our field study of a woman who is 80 years old. In ripening NFs extract, GC-MS analysis identified 100 phytochemicals, including D-limonene, 3-carene, gamma-terpinene, methyl eugenol, caryophyllene, hentriacontane etc. GCMS and virtual screening-cum-molecular dockingstudies have been done and reported first time to check the documentation and look for caryophyllene that could be used for pain-relieving properties. These compounds have been shown to have antioxidant, antimicrobial, anticancer, inflammation in the brain and oxidative stress-related effects. Our research confirms the bioactive potential of ripening NFs as an alternative medication source.

**Keywords:** Noni fruits, *Morinda citrifolia* L., GCMS, FTIR, XRD, Medicinal value.

**(**Note: Abstract is not exceeding 340 words)

**Keywords:** Noni fruits, *Morinda citrifolia* L., GCMS, FTIR, XRD, Medicinal value.

(Note: Keywords is not exceeding of 6 in numbers)