

Estimated Daily Intake and Health Risk of Heavy Metals by Consumption of Nutrient Rich Cyanobacteria Strains Isolated From Different Fresh Water Bodies of Sri Lanka

Malika^{1,2}, M.S., *Ratnayake¹, R.R., Bowange¹, R.W.T.M.R.T.K. and Sumanasinghe², A.

¹National Institute of Fundamental Studies, Sri Lanka

²Post Graduate Institute of Agriculture, University of Peradeniya, Sri Lanka

*Corresponding email: renukar@ifs.ac.lk

Cyanobacteria produce a wealth of high-value bio products and have been mass cultivated for centuries as a nutritional supplement. Today there are numerous commercial applications of cyanobacteria as they can be used to enhance the nutritional value of food and animal feed owing to their chemical composition. Heavy metal toxicity is a major threat and health risk of cyanobacteria. This study was carried out to analyze the heavy metals of nutrient rich cyanobacteria isolated from different fresh water bodies of Sri Lanka. Cyanobacteria containing water samples were collected from ten different water bodies, representing three climatic zones *i.e.*, Dry zone (Ariyakulam, Nelumwewa, Muthuvinayakasam, Kannaththiddikulam, Balaluwewa, Ibbankatuwa), Intermediate zone (Kurunegala, Kandy), Wet zone (Ambewela, Gregory). Samples were cultured in specific media (BG-11 and GO) and eleven uni-algal cultures (nutrient rich) were isolated by repeated sub culturing. The cyanobacteria were identified morphologically as *Phormidium* sp., *Cephalothrix komarekiana*, *Chroococcales* sp., *Planktolyngbia* sp., *Cephalothrix* sp., *Microcoleus* sp., *Oscillatoria* sp., *Mycrocystis* sp., *Synechococcus* sp., *Pseudaanabaena* sp., and *Dermocarpa* sp. Each cyanobacteria strain was tested against eight different heavy metals (Cd, Ni, Cr, Pb, Co, Cu, As, Fe) using ICP-OES machine. Cu and Co were present in significantly higher amounts compared to other elements. *Cephalothrix komarekiana* and *Dermocarpa* sp. had significantly higher amounts of Cu (70.2 µg/kg and 50.6 µg/kg, respectively) than the other species. *Cephalothrix komarekiana* and *Chroococcales* sp. had higher amounts of Co (24.0 µg/kg and 19.5 µg/kg, respectively). *Dermocarpa* sp. and *Cephalothrix komarekiana* had highest amounts of Cr (3.0 µg/kg and 2.6 µg/kg, respectively). Fe and Ni were present in considerable amounts in all the tested cyanobacteria strains. Heavy metals Cu and Co had exceeded the Estimated Daily Intake (EDI). Metals Cd, Pb and As were present in comparatively lower quantities in all the tested strains. The results suggested that tested heavy metals from cyanobacteria might involve in health related risks to the consumers.

Keywords: Estimated daily intake, Health risk, Heavy metals, Toxicity